TECH... EPT.

...EMBER, 1955

RUBBER WORLD

NOW IN ITS 67th YEAR

STABILITY FACTORS IN RUBBER COSTS, 1955–1960—RMA PANEL

By (left to right): W. E. Cake, Thomas Robins, Jr., W. J. Sears, J. W. Keener, L. E. Spencer, George Trenchard, page 375

Contents, page 371

BILL BROTHERS

UBLICATION

Protect against flex cracking in
TUBELESS TIRE SIDEWALLS

USE

THERMOFLEX A

the anti-oxidant that gives superior protection against flex cracking

No other anti-oxidant is better for flex-crack resistance

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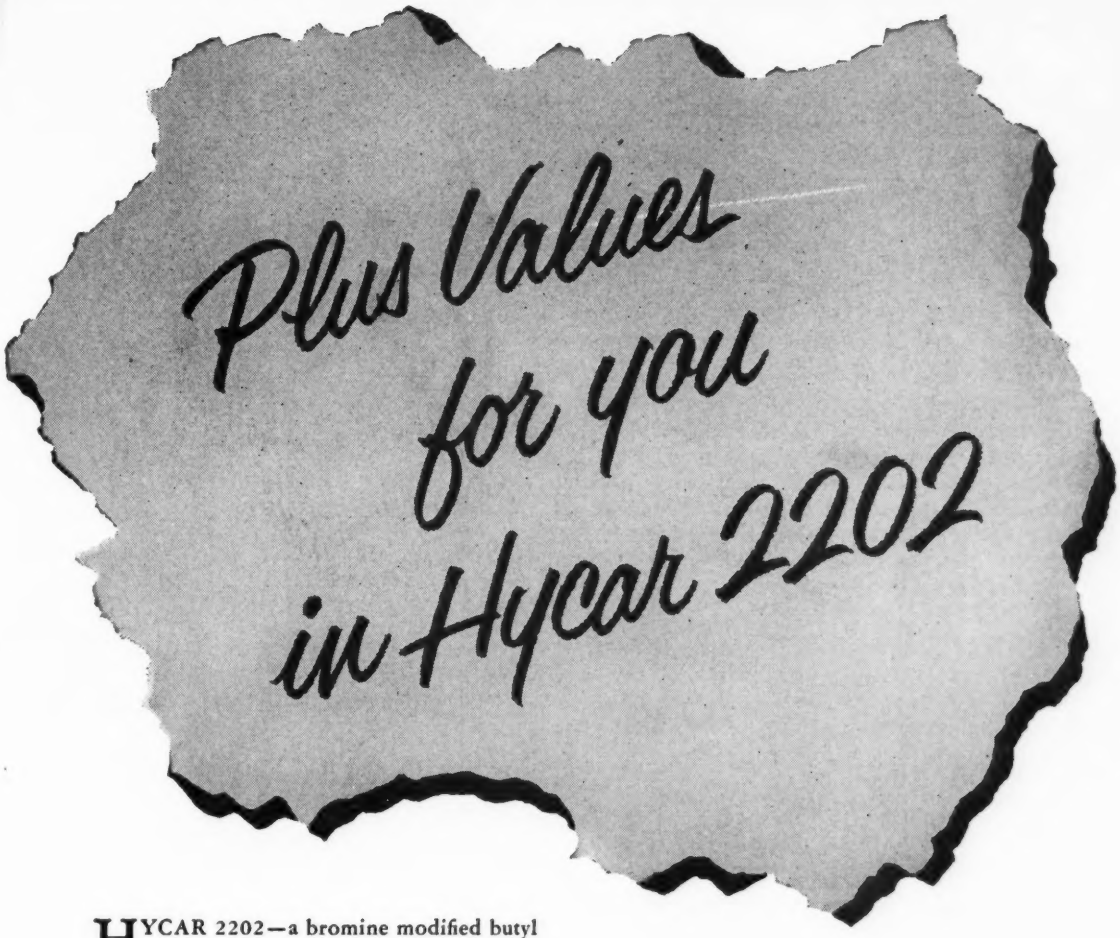
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

RUBBER WORLD, December, 1955, Vol. 133, No. 3. Published monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States $5.00 per year; Canada, $6.00; All other countries $7.00; Single Copies 50 cents. Address Mail to N. Y. Office.

News about

B. F. Goodrich Chemical *raw materials*



HYCAR 2202—a bromine modified butyl rubber—offers outstanding properties unobtainable with conventional butyl, yet retains the typical butyl properties of excellent ozone resistance, heat and light aging resistance, electrical resistance, and exceptionally low air permeability.

Check these plus values . . . they may add up to important new applications; perhaps show you how to improve an operation or make a superior product.

CURES FASTER, MORE CONSISTENTLY . . . good, consistent cures obtainable using only approximately one-half as much accelerator.

EXCELLENT COMPATIBILITY . . . can be blended and cured with crude, GR-S, butyl, and other rubbers.

SUPERIOR BONDING . . . adheres strongly to butyl, other rubbers, and metals.

WIDE RANGE OF APPLICATIONS . . . cement and adhesives, wire and cable, tire curing bags and bladders, inner tubes, coated fabrics, belts, hose and tubing, and mechanical goods.

Hycar 2202, originally introduced as Hycar HH, is now readily available in commercial quantities. For complete technical information, please write Dept. CL-12, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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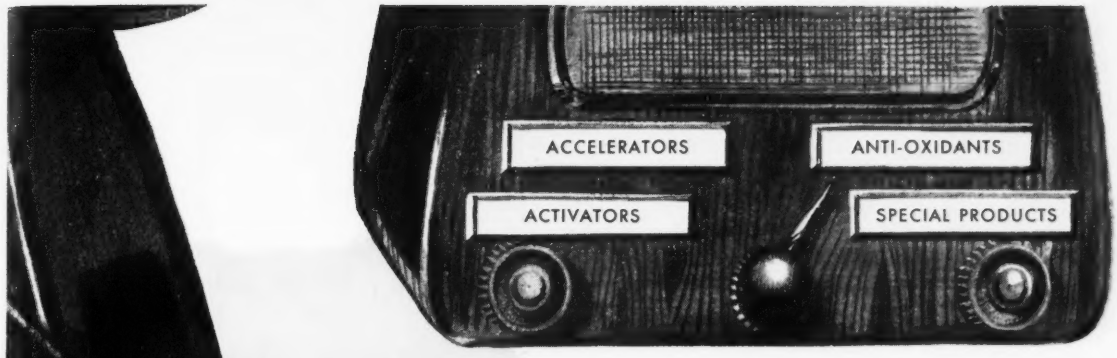
PHILLIPS CHEMICAL COMPANY, Rubber Chemicals Division, 318 Water St., Akron 8, Ohio. Export Sales: 80 Broadway, New York 5, N. Y. West Coast: Harwick Standard Chemical Company, Los Angeles, California.



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answers all your rubber chemical problems

Naugatuck supplies a complete line of proven accelerators, activators, anti-oxidants and special rubber chemicals. These chemicals give you complete control of rubber product manufacture and performance. Some are standard chemicals. Others are specially selected. All have been developed to impart specific properties under controlled situations. And they were produced under the guidance of the experienced rubber technologists of the world's leading manufacturer of rubber chemicals—Naugatuck.

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LESS THAN 1% REJECTS

on precision-molded part with PLIOLITE S-6B

The part is a two-piece, semihard rubber head for an industrial window washing brush. It must be light in weight, tough, abrasion-, water- and chemical-resistant, easily machined and attractive.

To meet these requirements, a reputable specialty molder uses 50 parts of PLIOLITE S-6B per 100 parts of styrene rubber. By so doing he avoids excessive loading and achieves a Shore "A" Hardness of 90 with an important quarter-pound savings in weight.

Other results of using PLIOLITE S-6B are: 1. Easy molding with faithful reproduction of all mold detail. 2. An eye-catching sheen to the surface. 3. Machinability approaching that of metal. 4. Excellent resistance to all forms of abuse.

But, as on any close-figured job, the big bonus is in the greatly reduced number of rejects. Whereas in molding similar parts using highly loaded stocks he experienced up to 3 to 8% rejects, PLIOLITE S-6B has cut the rejects of this part to well under 1%—to "practically none."

Moreover, additional savings are realized in the masterbatching of the stock. The ability of PLIOLITE S-6B to disperse quickly and thoroughly in the rubber has noticeably reduced mixing time and costs.

PLIOLITE S-6B is the high styrene-butadiene copolymer specifically designed to be easy processing without sacrifice of its reinforcing properties. How can it help your product? For details write to:

Goodyear, Chemical Division, Akron 16, Ohio

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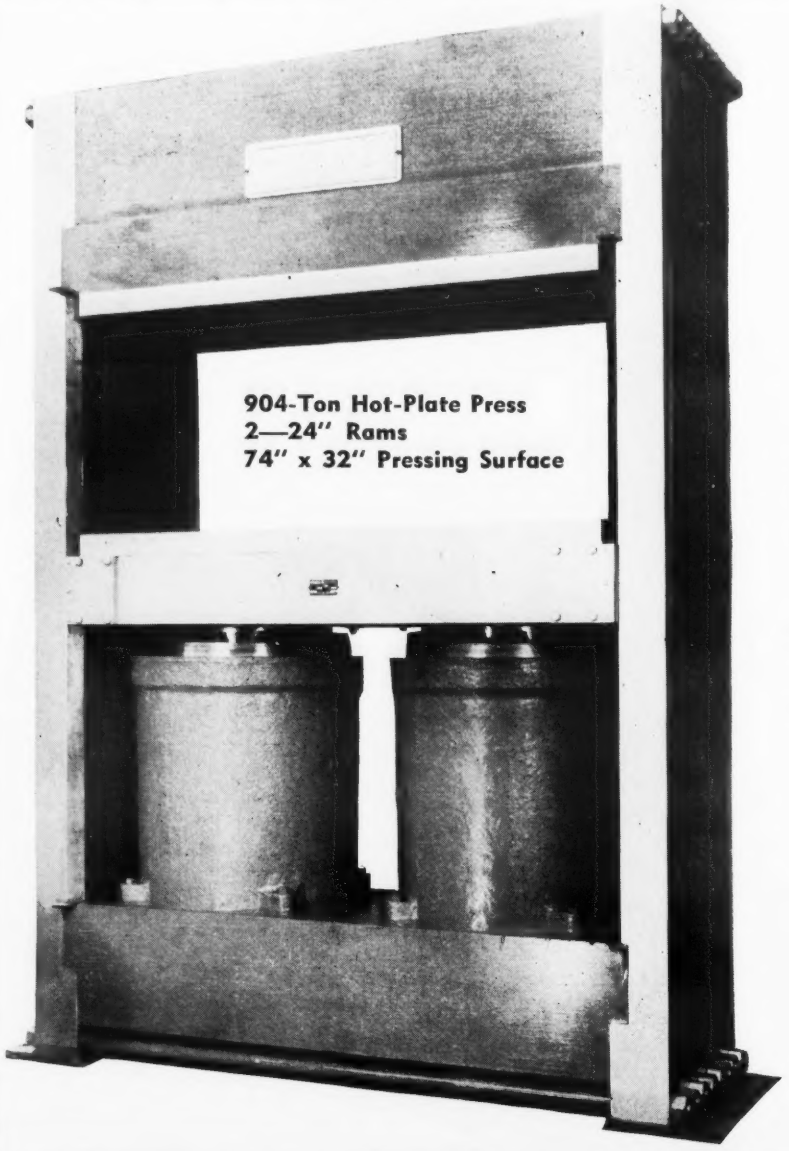
PLIOLITE S-6B . . . another quality product of Goodyear Chemical Division

LIGHTNESS, TOUGHNESS, ATTRACTIVENESS–all are imparted to this molded industrial brush head by PLIOLITE S-6B–easily, inexpensively and with virtually no rejects.

Photo courtesy Ames Rubber Corporation, Hamburg, N. J., and Empire Brushes, Inc., Port Chester, N. Y.



FRENCH

HYDRAULIC PRESSES SIDE PLATE DESIGN

The two-cylinder press in the photograph is another example of the flexibility of the side-plate press. With its patented "locked" construction and guided platen design, the French side-plate press is the finest rubber molding press at *ANY* price. If you want the best, ask for one of our representatives to discuss your press requirements with you. (Ask him about the new tilting die side-plate press.)

TRIED–TESTED–PROVEN TO BE THE BEST

All standard sizes available. Write for illustrated catalog.

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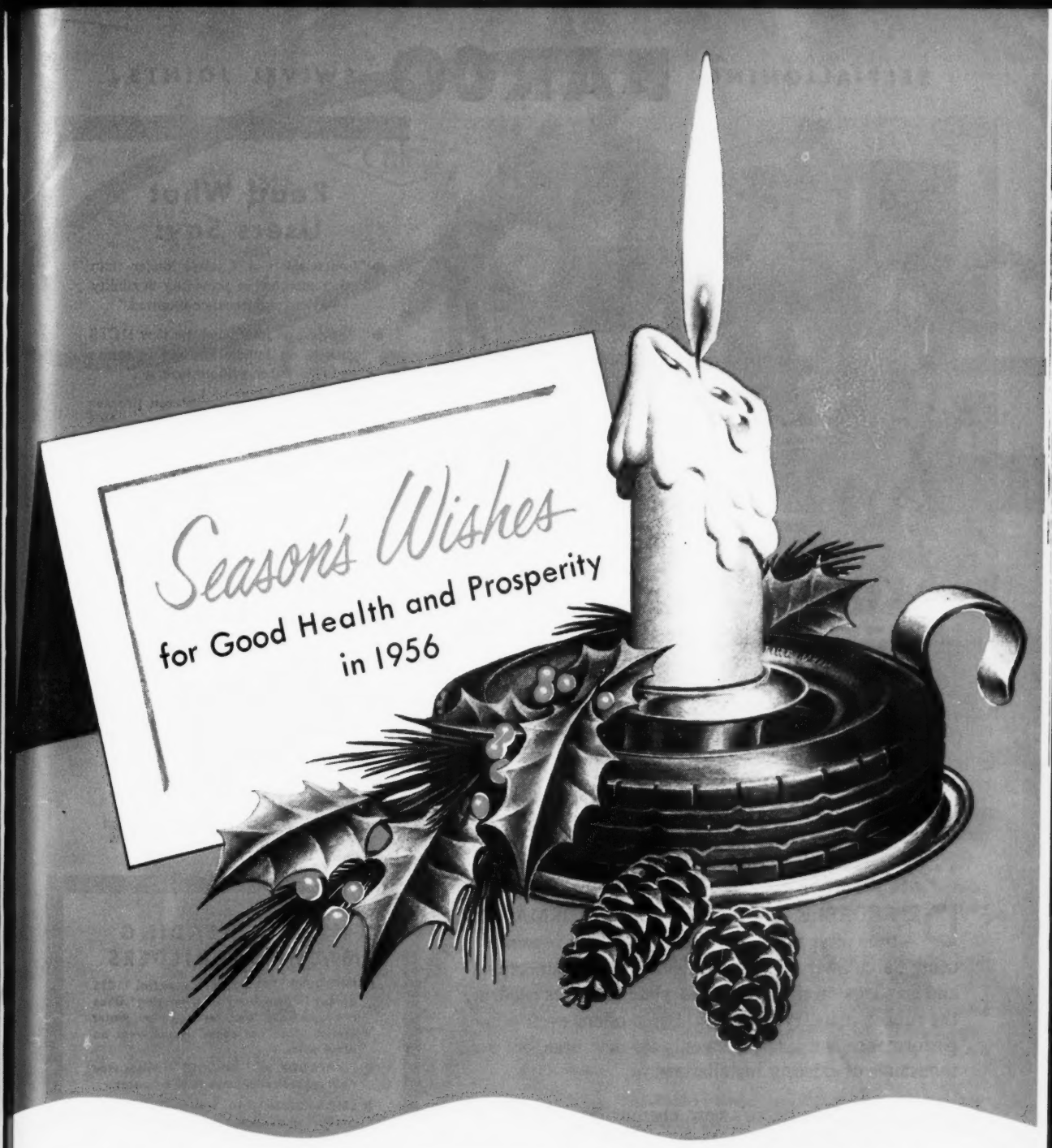

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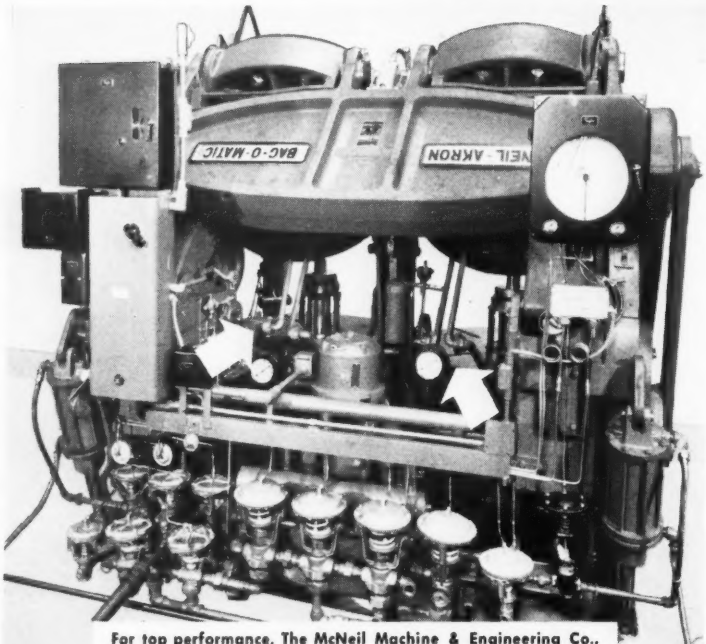
SELF-ALIGNING **BARCO** SWIVEL JOINTS



For top performance, The McNeil Machine & Engineering Co., Akron, Ohio, uses Barco Swivel Joints to make flexible piping connections on this twin platen McNeil Bag-O-Matic press and for water bag connections on other types of tire curing.

Read What Users Say:

- "Joints last 3 or 4 times longer than other methods of providing flexibility —with no maintenance required."
- "With Barco Joints and the new 11CTS gaskets we handle alternating steam and cold water without leakage."
- "Barco Joints on our platen presses *don't get in the way* like non-rigid lines. They permit *accurate temperature control too.*"
- "We're interested in *safety and avoiding shut downs.* Your joints *don't break or fail suddenly.*"
- "Your self-alignment feature makes *installation easy.*"
- "We like your joints because they require so little maintenance. We don't even have to lubricate them."

How Improved Barco Swivel Joints Make Tire Molds, Presses Work Better

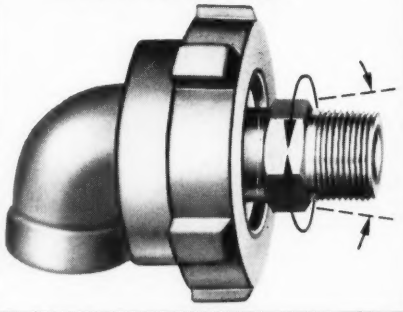
DEPENDABLE, TROUBLE-FREE PERFORMANCE —time after time—has been the one big reason for using Barco Swivel Joints in flexible piping connections and dog-legs on tire molds and platen presses used in the rubber industry. And now Barco offers even *better* performance and service, not only for new uses, but for thousands of existing installations.

The ANSWER is Barco's new, chemically inert No. 11 CTS gasket. No other material is as amazingly long wearing and versatile. Even under most adverse conditions, joints maintain their seal, hot or cold, working or idle — with lower torque and no lubrication required. Natural operating action keeps the hemispherical ball of the joint lapped to a perfect fit.

Get this advanced performance in new Barco Swivel Joints! Send for complete information on MODERNIZING old joints!

USED BY LEADING MACHINE BUILDERS

- **IMPROVED SEAL** — Barco's new No. 11CTS gasket is amazingly long wearing! Does not bake hard. Ideal for steam and water service. Does not cause excess wear on other parts.
- **LEAKPROOF, HOT OR COLD** — Joints stay tight regardless of pressure or temperature.
- **SELF-ALIGNING** — 10° side flexibility. This Barco feature saves piping time, cuts costs, and insures perfect performance.
- **ENGINEERING RECOMMENDATIONS** — Send for a copy of Catalog No. 265A and installation drawing 10-52004.



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BOUND BROOK, NEW JERSEY

NO. 2 OF A SERIES

Cyanamid wishes you a Merry Christmas

SIGNIFICANT NEW DEVELOPMENTS were scored by the rubber industry in 1955. Among them:

New Synthetic "Tree" Rubber has superior crack resistance and heat stability. Development marks first synthesis of natural rubber molecule.

Tubeless Blowout-Proof Tires for trucks—this in addition to tubeless tires for airplanes and automobiles.

Electrically Heated Rubber Boots will warm rotor blades of helicopters to prevent icing.

New Off-the-Road Truck Tire has 50% greater resistance to cutting and tearing than ordinary tires.

Colored Sidewall Tires now in commercial production – blue, green, brown available.

Cities Planning to Install Conveyor Belt systems for pedestrians in business areas, shopping districts, and between parking lots and business centers.

All-Rubber Underground Sprinkling system successfully passed its winter test.

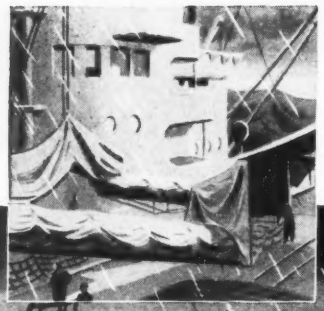
Liquid Rubber goes into new golf ball for women – gives longer drives.

Self Adjusting V-Belt eliminates noises in blower heating systems, including fans.

Rubber Helps Make It A

MERRY CHRISTMAS

Colorful, practical, much-wanted gifts made of rubber will add to the excitement of many a family's Christmas this year, as in the past. Among these gifts are many new products which demonstrate the great achievements of this progressive industry.



WELKOTE—Wellington Sears nylon backing fabric, when neoprene or vinyl-coated, combines light weight plus strength for a multitude of protective covering uses. Besides all-weather hatch tents for shiploading, these include playing field covers, machinery and freight tarpaulins, fumigation tents, etc.

Wellington Sears fabrics back up the versatility of these coated materials

For coated auto and furniture upholstery, luggage, handbags, wall coverings and many other end uses, Wellington Sears backing fabrics include cotton sheetings and drills, twills, sateens and ducks; spun rayon, "Welkote" filament nylon and other synthetics; "KnitKote" cotton knit fabric; "Lantuck" and "Lantuck-NR" (nylon-rayon) non-woven fabrics. All end-use "engineered."

American industry today is setting no limits to the possible uses of coated materials. And there's more to these materials than meets the eye. Beneath the colorful and serviceable surface, there is a backing fabric that provides the basic strength.

But there's still more to this "inside" story. Because of special problems of tear-strength, durability, flexing, weather resistance, tailoring qualities, adhesion and the like, this backing fabric must be carefully *engineered* for each type of application.

This is where Wellington Sears enters the picture. Nowhere else will you be able to match our many decades of experience with fabrics of this type. And nowhere else will you find such a complete range of different base fabrics for every conceivable plastic and rubber coating use.

Wellington Sears makes the backing fabric only—not the finished coated product. So, if you have a coating problem—or any problem that involves fabric in combination with rubber or plastics—let our experience go to work for you. For booklet, "Modern Textiles For Industry," address Dept. H12.

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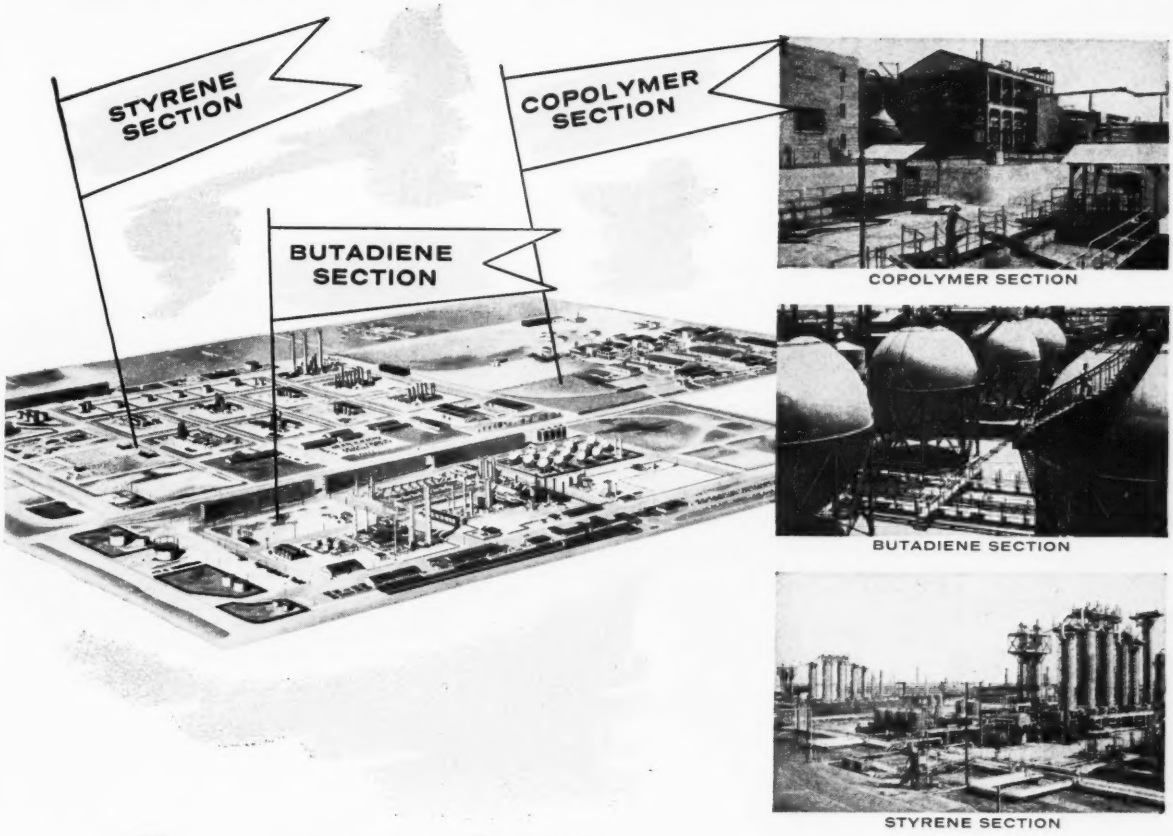
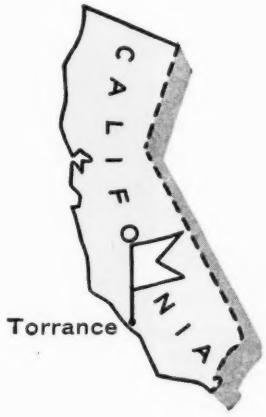


In the West...

Here's the handy source of

Synthetic Rubber



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Torrance, California, deserves a big star on your map of rubber sources. It's the home of Shell Chemical's synthetic rubber plant . . . one of the nation's best equipped for the production of a variety of types of butadiene-styrene rubber.

Whether you need a bale or a carload . . . for sheeting, molded goods, extruded goods, tires or other uses, Shell Chemical can fill your requirements promptly.

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the points add up

. . . add up to extremely high efficiency coupled with absolute economy. Press the control button of a Shaw Calender and you receive a sum of all the experience, productive facilities, research results, and specialized knowledge concentrated in one grand total—better production.

The machine illustrated is a 4-roll inverted L type with each roll driven by its own variable speed motor through a unit gearbox.

the sum total of experience ✳

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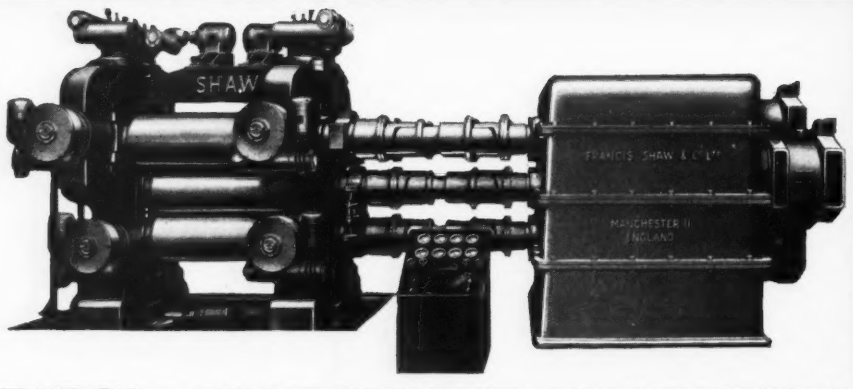

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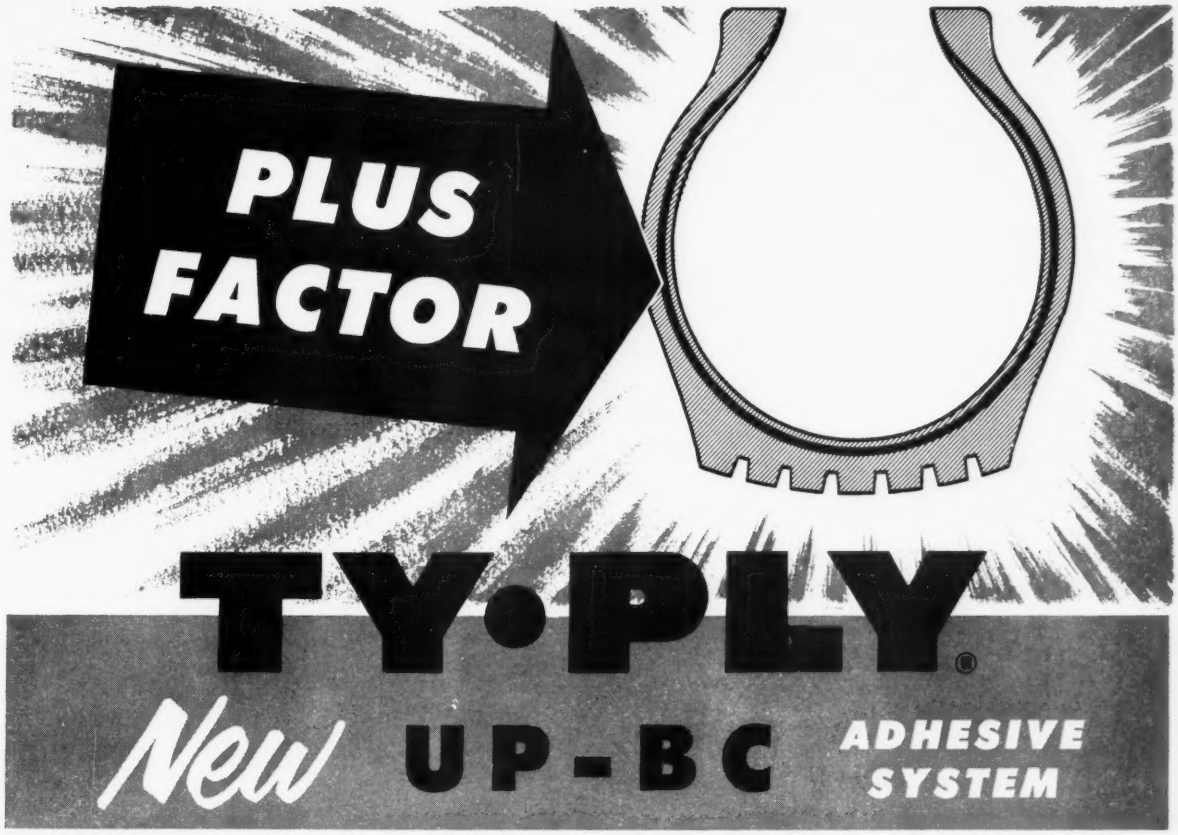

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TY-PLY UP — the universal Primer, and TY-PLY BC, the Butyl Cover Cement, give exceptional bonds of Butyl compounds to metals regardless of cure system or type and amount of filler.

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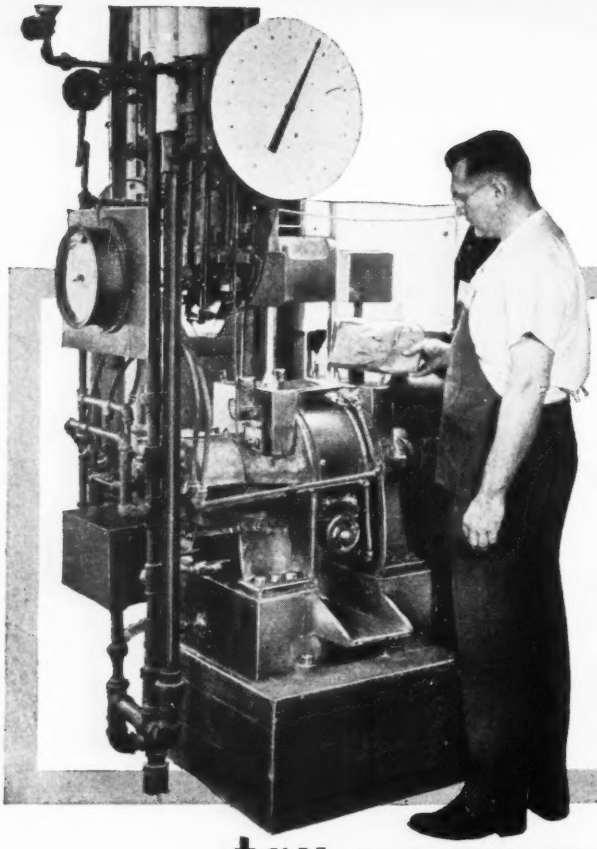
TY-PLY has stood the test of time . . . since '39



need MORE mixing capacity?

...try PROTOX* zinc oxides

You mix faster, turn out more zinc masterbatches per day, with Protox oxides than with conventional oxides.

HERE ARE THE REASONS WHY:

1. *Protox oxides are up to 33% denser.*
In Banbury mixing, they drop to the bottom of the chamber where the rubber can best incorporate them.

2. *Protox oxides are wetted faster by all types of rubbers.*
The zinc propionate coating, exclusively on Protox oxides, enables rubber to displace air quickly from the particles.

3. *Protox oxides disperse faster, more completely.*
Their coating definitely plasticizes the rubber, and increases the affinity of rubber for the particles.

How much can you increase your mixing capacity with Protox zinc oxides? Best way to find out is to take in a trial order now.

*U.S. Patents 2,303,329 and 2,303,330

THE NEW JERSEY ZINC COMPANY
Producers of Horse Head Zinc Pigments
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Our Buffalo plant is ideal for quick service to western points, because it is within 200 miles of Akron, and is large and fully equipped. It is a good central point for shipment by rail, truck, or water. Our Derby plant is heavily stocked for quick service to eastern points.

FASTER SERVICE WITH

Two plans for Banbury® body exchange
Two locations to ship from

1. You get fastest service by exchanging your worn Banbury for a new one. We carry stocks of new bodies at our Buffalo plant for shipment to western points, and at our Derby plant for shipment to eastern points. Production economies have enabled us to lower the price of new bodies.

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At Farrel-Birmingham, the Banbury mixer is constantly being improved in design and materials. When you replace an old body with either a new or rebuilt one from Farrel-Birmingham, you gain the benefits of modern design improvements, plus the experienced and expert workmanship of the original builder of the machine.

When you need Banbury repairs or rebuilding, make sure you get the kind of job that will give you new Banbury performance. Call the Farrel-Birmingham office nearest you.

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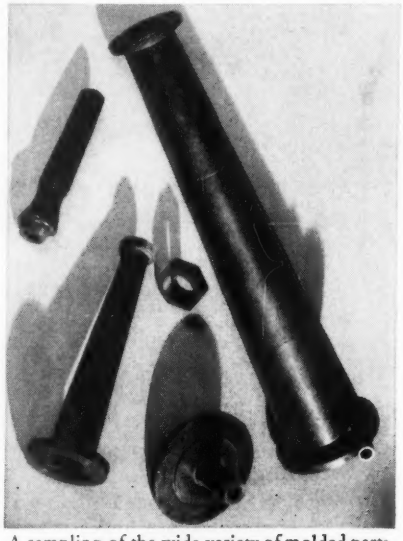
PHENOLIC RESINS

for producers of hard and semi-hard **NITRILE RUBBER** *stocks*

1. *Improve* **MIXING** – the resin plasticizes and reduces nerve.
2. *Carry more* **LOADING** – due to its fluidity when hot.
3. *Improve* **MOLDING** – it becomes plastic and then hardens.
4. *Speed up* **VULCANIZING** – by its fast cure and vulcanizing effect.
5. *Increase* **HARDNESS** – it sets hard of itself.
6. *Increase* **STIFFNESS** – through its natural cured rigidity.
7. **REINFORCE** – with increased tensile strength.
8. *Step up* **WEAR** – it improves abrasive resistance.
9. *Withstand higher* **HEAT** – by its inherent heat resistance.
10. *Add* **CHEMICAL** *resistance* – by its natural resistance to solvents and chemicals.
11. *Produce* **GLOSSY** *finish* – another inherent resin property.
12. *Add* **WATER** *resistance* – by its resistance to water and oxidation.

If you have never used Durez resins in formulas for hard and semi-hard stocks made with nitrile-bearing rubber, you may think this list of benefits is "a little too long." All we can say is, they've all been reported to us by rubber manufacturers on the basis of experience. But there's no evidence so believable as your own. Why not test our special Durez resins for rubber compounding in your own laboratory? We'll gladly cooperate with samples and technical information.



A sampling of the wide variety of molded parts made of nitrile rubber compounded with Durez phenolic resin.

YOURS FOR THE ASKING — Our revised bulletin on resins in the rubber industry contains technical information that will help you assess these new procedures. Also free samples. Write today.

DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

212 Walck Road, North Tonawanda, N. Y.

Phenolic Resins for rubber molding stocks, solvent-type adhesives, synthetic rubber latices

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- PROTECTIVE COATING RESINS

The Travois and All Outdoors

Until the Spaniards brought horses to North America, the Indian of the plains was limited to short distances in his travels. The horse opened up larger areas, and his trips often extended into "many sleeps." When time came to move the lodges, squaws loaded the travois and the tribe had all outdoors in which to travel.

It was just 150 years ago that the white man first crossed the plains and the mountains and reached the shores of the Pacific Ocean. In the years since, the once open land has become peopled; progress undreamed of has taken place. But of all man's achievements perhaps none is more evident than the constant improvement brought about in transportation.

In answer to urgent need, man has created ingenious vehicles. His roads and highways, however, have become inadequate for the volume of traffic which every hour pours forth from home, farm and factory.

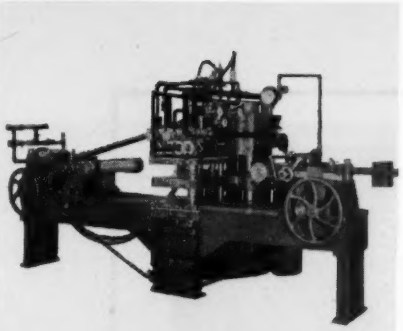
Freedom of movement is one of man's inherent privileges. Though he cannot return to the days when, like the first American, he might load his travois and have all outdoors to travel in, still with a constantly expanding highway system he can continue to grow, spread out and have quick communication with all parts of the land.

Adequate highways for the transportation of man and his products — these are the important needs for a growing America.

UNITED CARBON COMPANY, INC.

MAKERS OF CARBON BLACKS FOR TODAY'S TIRES

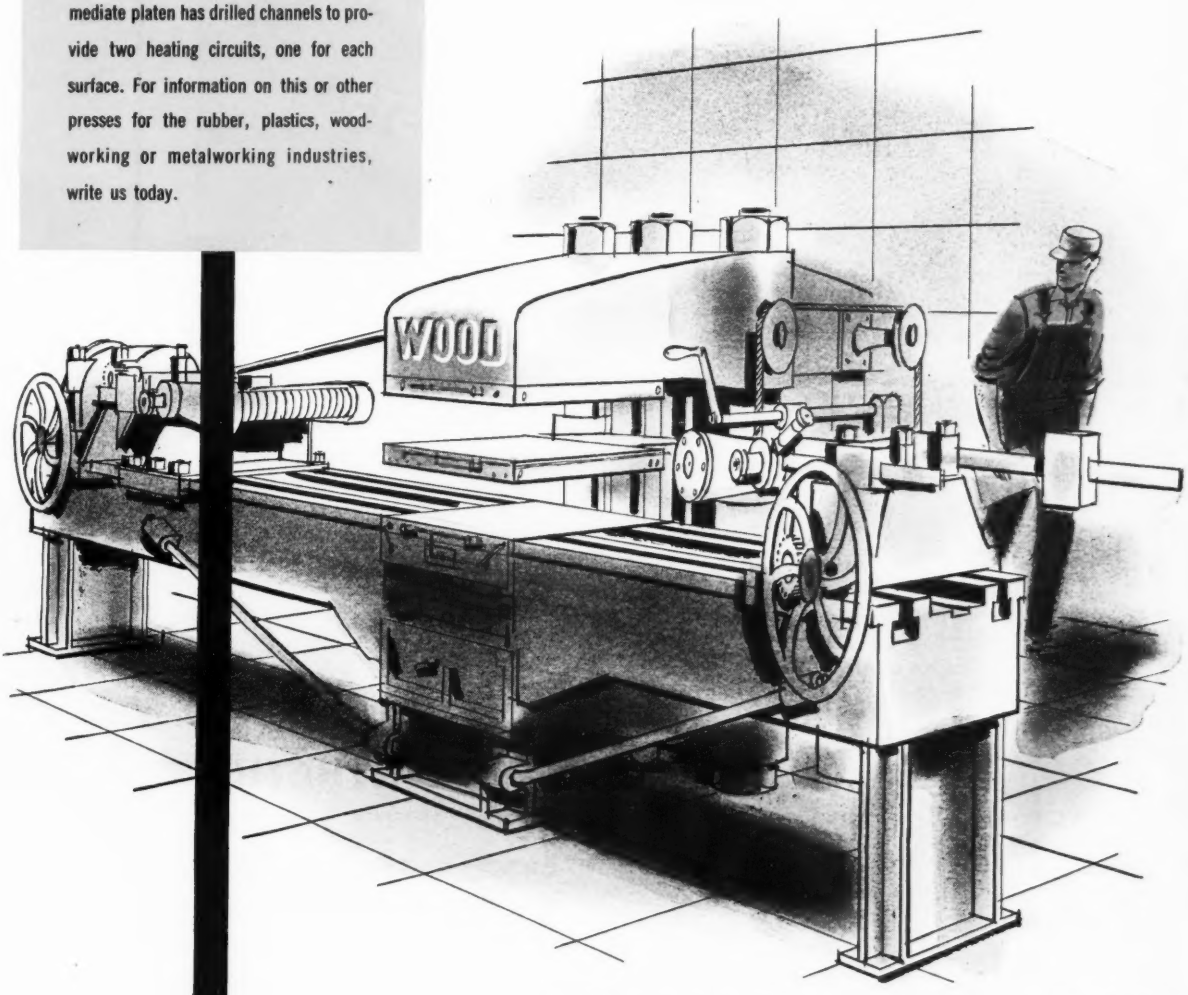
The staff of
United Carbon Company, Inc.
extends its sincere greetings
and good wishes
at this holiday season
to all its friends
in the rubber industry.



Open Gap 47-Ton Belt Press for curing flat and V-type transmission belts. The moving platen is accurately machined from a rolled steel slab and is guided by long, full-round babbitted guides on the strain rods. Intermediate platen has drilled channels to provide two heating circuits, one for each surface. For information on this or other presses for the rubber, plastics, woodworking or metalworking industries, write us today.

Prelude to low-cost production

When an R. D. Wood press swings into action, gratifying things happen to production costs. For, in most cases, production climbs to a new high and down-time for repairs approaches zero. The reason is the smooth, dependable performance of R. D. Wood presses—even under difficult conditions. And the reasons for this superior performance are the exacting standards set by R. D. Wood—in design, selection of materials, and craftsmanship. If your company's theme is low-cost production, here is your prelude—ready made.



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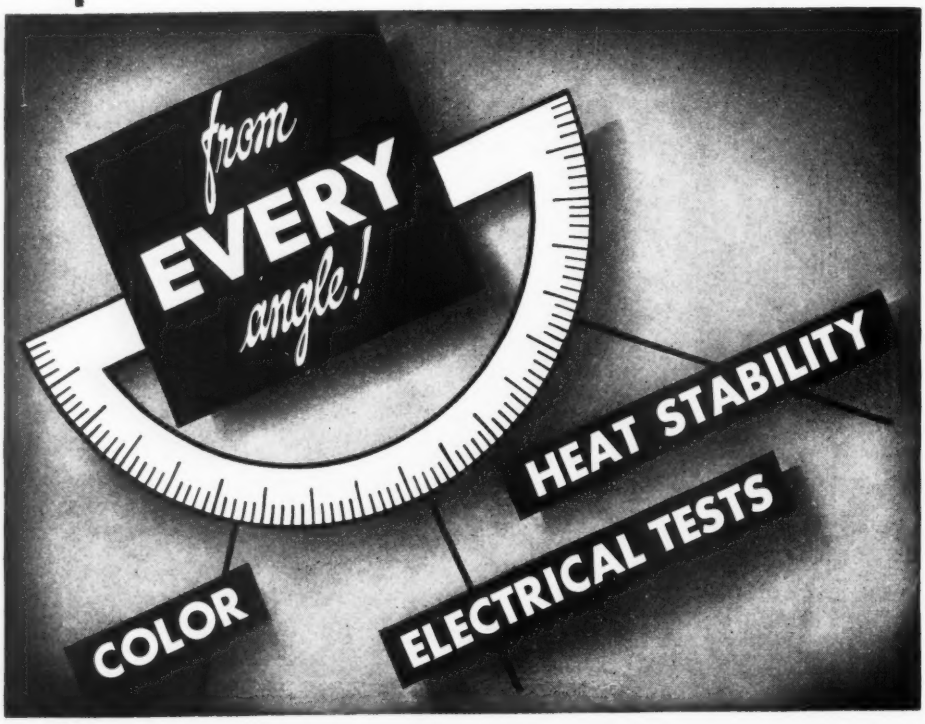

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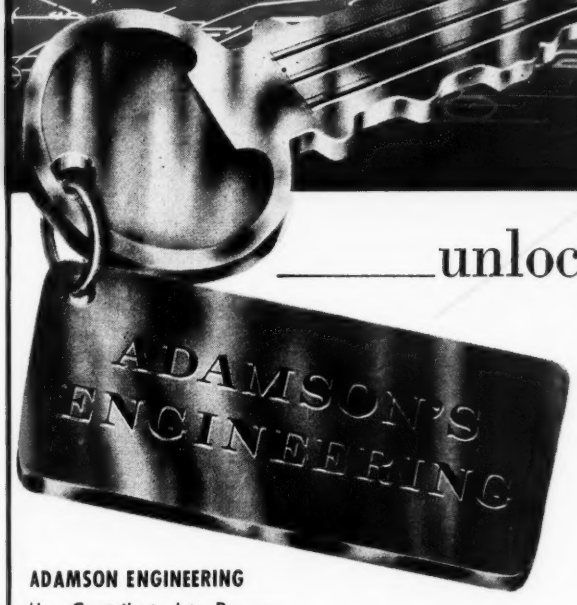
_____unlocks the door to progress in many industries



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- Hardboard
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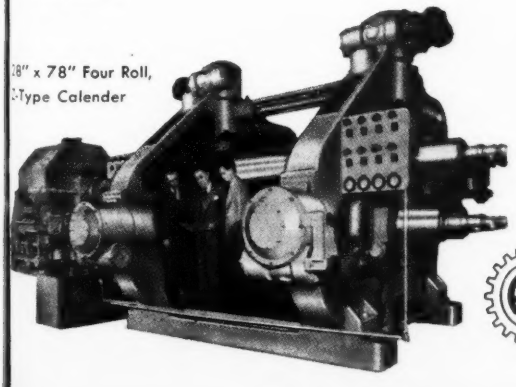

78" x 78" Four Roll, -Type Calender

Machine development, plant layout and industrial control is our business. By creating and perfecting unusual processes and special machinery for making entirely new products, or for processing new materials, Adamson Creative Engineering has enabled many industries to reduce expense and meet competition through the manufacture of better products at lower cost.

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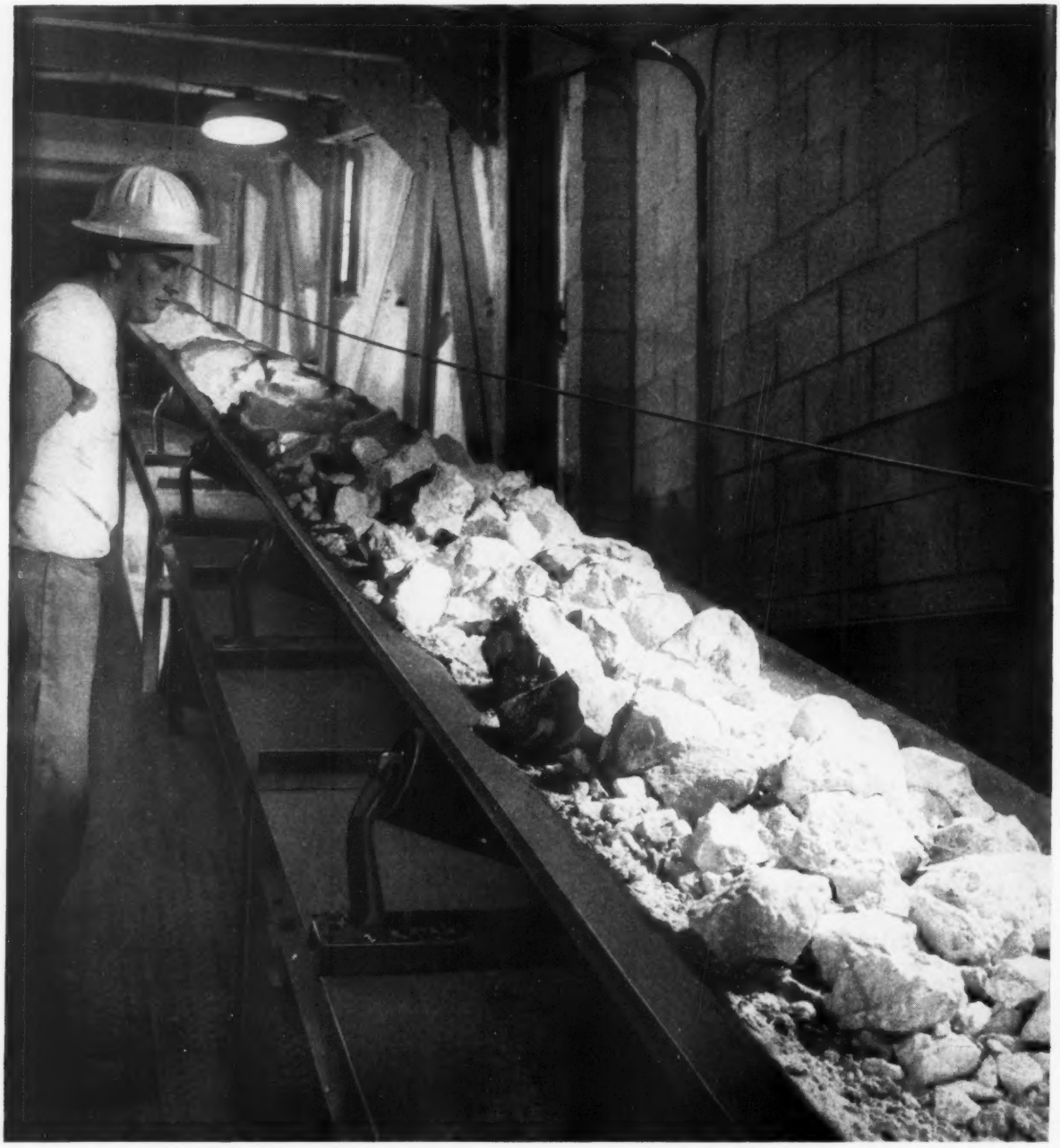

THE FABRIC THAT MOVES MOUNTAINS – National Gypsum Company's new gypsum mine at Shoals, Indiana, needed a really tough conveyor system employing a belt nearly a mile long – one that could move loads up to 350 tons per hour up a shaft 500 feet beneath the surface of the earth at an incline of better than 17 degrees. Hewitt-Robins, Inc., supplied this belt – with a carcass especially constructed from rayon and nylon by Mt. Vernon-Woodberry Mills. The new belt, called a Super Raynile Conveyor Belt, is lighter than comparably strong cotton duck and rubber. It is more resilient and equal in strength to steel reinforced belting. Testing in use has shown it to be one of the strongest ever built.

This is another example of how fabrics made by Mt. Vernon-Woodberry Mills, and the industries they serve, are serving America. Mt. Vernon-Woodberry Mills engineers and its laboratory facilities are available to help you in the development of any new industrial fabric or in the application of those already available.

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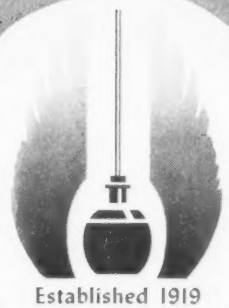


Established 1919

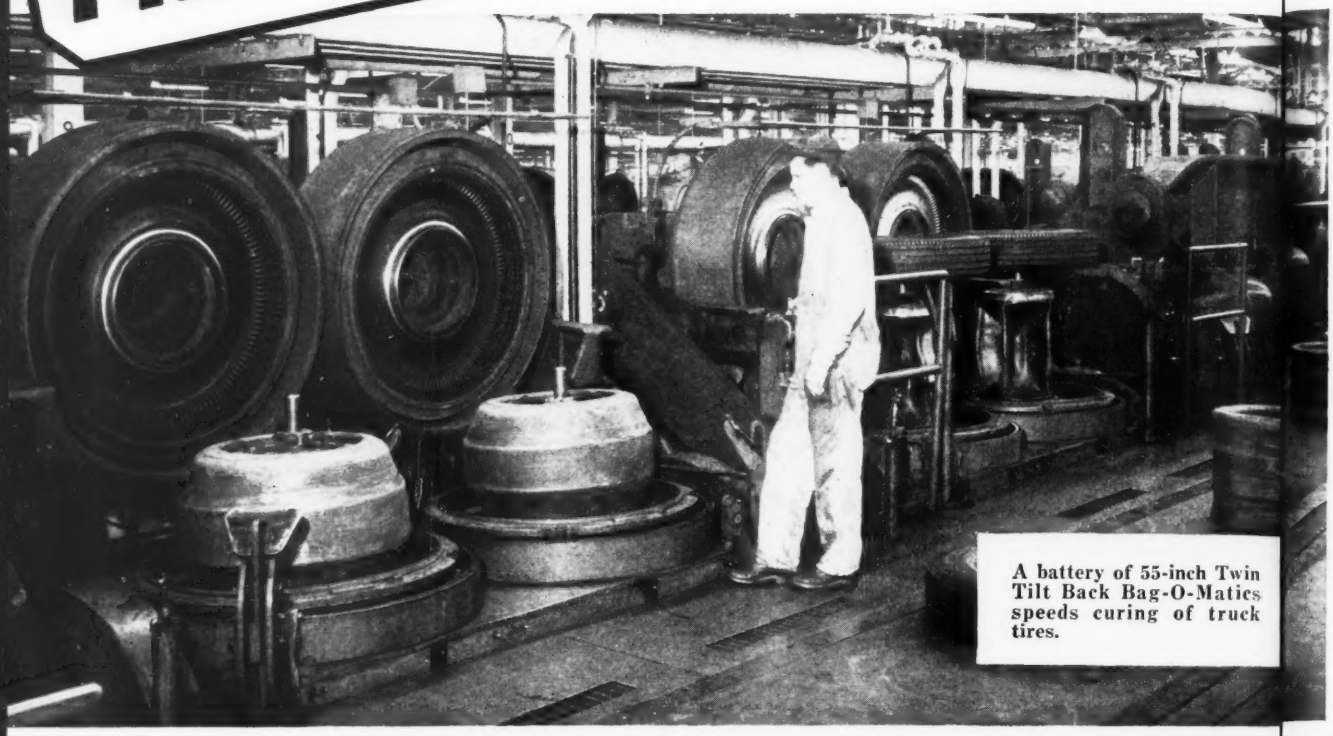
Akron, Ohio

Los Angeles, Calif.

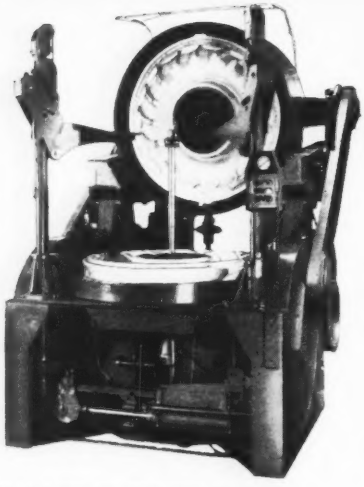
Chicago, Ill.

San Francisco, Calif.

PROVEN IN TIRE PLANTS



A battery of 55-inch Twin Tilt Back Bag-O-Matics speeds curing of truck tires.



Model 900-75-25D Tilt Back Bag-O-Matic has 900,000 pounds holding pressure on the mold.

BETTER, EASIER, SAFER AND FASTER CURING OF TRU

McNEIL-AKRON TILT BACK BA

With the new McNEIL-AKRON Tilt Back Bag-O-Matic Presses, manufacturers of truck and off-the-road tires can now have all the advantages of the Bag-O-Matic principle. This is the same proven technique that has lowered production costs while improving the quality of passenger tire manufacturing throughout the industry.

The greatest advantage is the substantial reduction in curing time.

Other advantages realized from the use of these Heavy Duty Bag-O-Matic Presses may be summarized as follows:

BETTER CURING—Automatic, accurately controlled curing temperatures and time cycles.

EASIER OPERATION—Complete access to center mechanism and mold areas for mold changing, bag replacement, green tire placement and cured tire removal by means of overhead handling equipment.

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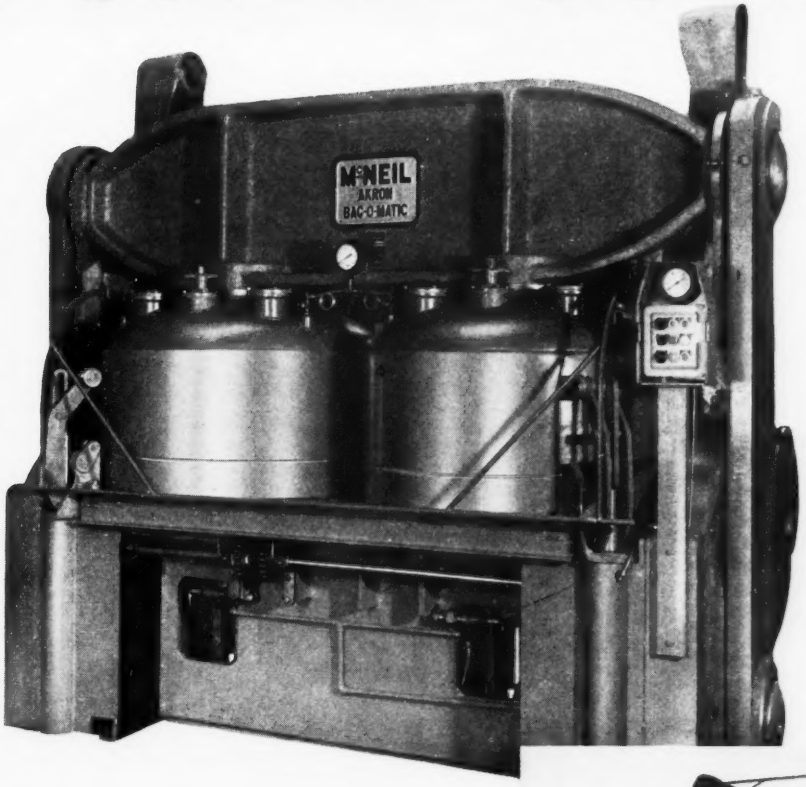


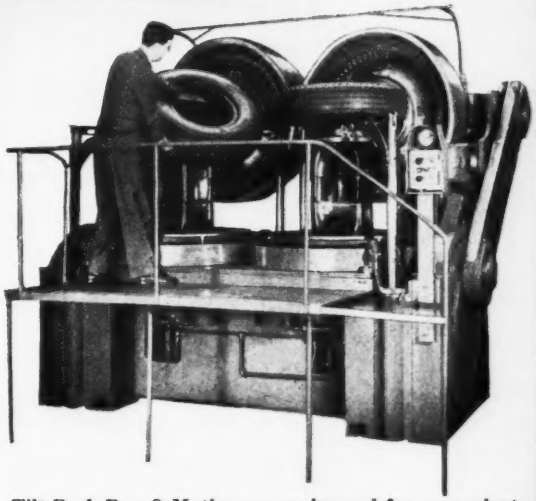
Model 450-55 16D Tilt Back Bag-O-Matic has 450,000 pounds holding pressure on each mold position.

TRUCK AND OFF-THE-ROAD TIRES with BAG-O-MATIC PRESSES

SAFER OPERATION—All of the proven McNeil safety features including safety bars and pressure switches are incorporated to provide complete operator protection.

FASTER PRODUCTION—In addition to the faster, superior cures that result from the Bag-O-Matic process, McNeil-Akron Tilt Back Presses are designed for unequalled loading and unloading speed and for all-around maximum production efficiency.

There are additional advantages, too, which make these units extremely desirable for your truck and off-the-road tire curing requirements.*



Tilt Back Bag-O-Matics are engineered for convenient, speedy and safe operation. Head tilts backwards 90° to facilitate laying of green tire and removal of cured tire via electric hoist. Design also makes it easier to change molds and Bag-O-Matic "ring and bag" assemblies.

*12.00 x 20 maximum size in 55" press, and up to 18.00 x 24 in the 75" press.

MANUFACTURING AGENTS: Francis Shaw & Company, Ltd., Manchester, England; Vickers-Ruwolt Proprietary, Ltd., Victoria, Australia; Luigi Pomini, Soc. in Acc. di Luigi e Carlo POMINI fu Egidio e C, Castellanza, Province of Verese, Italy; Etablissements Repiquet, Bobigny (Seine), France; Harburger Eisen Und Bronze-Werke A. G., Hamburg-Harburg, Germany.

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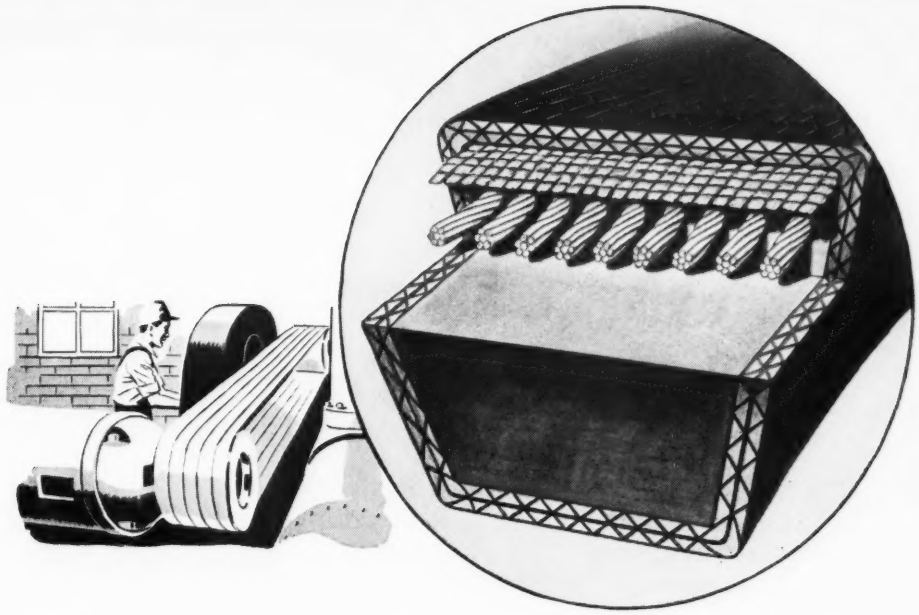

Why Thermoid Company uses Celanese* FORTISAN*-36 rayon in V-belts

Thermoid Company of Trenton, New Jersey, now uses FORTISAN-36, the new Celanese high tenacity, heavy duty rayon made from saponified acetate as the reinforcing cord in V-belts where severe stress is anticipated.

FORTISAN-36 has been found superior in both "performance" and "elongation" to competitive fibers.

Thermoid officials say "its 'performance' is considerably better than that of conventional fibers. Change of cord length throughout the belt life is practically infinitesimal, and is not affected by 'work' or atmospheric conditions."

FORTISAN-36 is presently being used for V-belts subjected to severe drives in automatic washing machines, power lawn mowers, passenger cars, trucks, and farm tractors.

If you have a stake in any of these areas—or are concerned with any industrial problem where high strength yarns are important—we'd like to work with you on the application of FORTISAN-36 to your products.

Our technical men have a wealth of data which may indicate some new approaches to you.

For further information, write for Booklet T. D. 20 to Celanese Corporation of America, Industrial Sales Department, Textile Division, Charlotte, North Carolina. Branch offices: 180 Madison Avenue, N. Y. 16, N. Y.; Pilgrim Square Building, 9 Overwood Road at West Market Street, Akron 13, Ohio, Telephone TE 6-2392.

*Reg. U. S. Pat. Off.

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. . . plays a big part in the S.C.S.*
Method of Rebuilding BANBURY MIXERS

* S.C.S. means Skinner Certified Service. A tool is no better than the man who operates it. Skinner has the most improved machine tools for every required operation . . . and the men who run them have had long experience in precision operations. The same close tolerance work as required in the building of SKINNER high-precision steam engines is employed in the rebuilding of Banbury Mixers. It's the same type of work they grew up on. Searching inspection and rigid testing, too, are routine procedures . . . on SKINNER Engines or Banbury Mixers.

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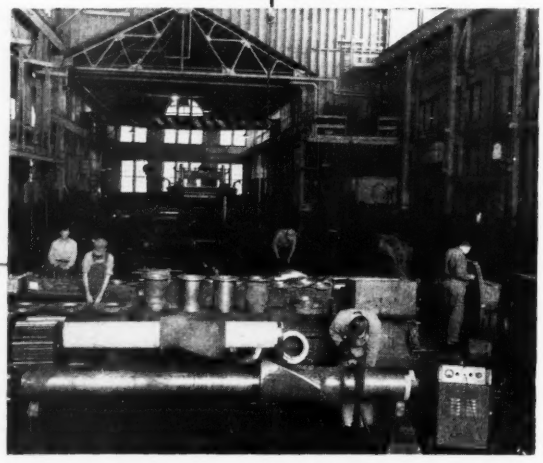

Inspection of Banbury parts prior to assembly in the Skinner plant.

A *few* POINTERS ON S. C. S.

- All rebuildable parts of dismantled body are checked for hidden imperfections, for standard dimensions and distortion.
- Sides are bored out, and 2-in. liners of customer's choice installed.
- Rotors are completely stripped of hard-surfacing materials, and bodies rebuilt to proper contour. Entire rotor, inclusive of threads, is rebuilt, body hard surfaced, stress relieved, and restored to standard dimensions.
- Sliding door, dust seal rings, and body fit bolts are always provided new.
- All parts are carefully examined by skilled technicians and magnafluxed.

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RUBBER MACHINERY DIVISION
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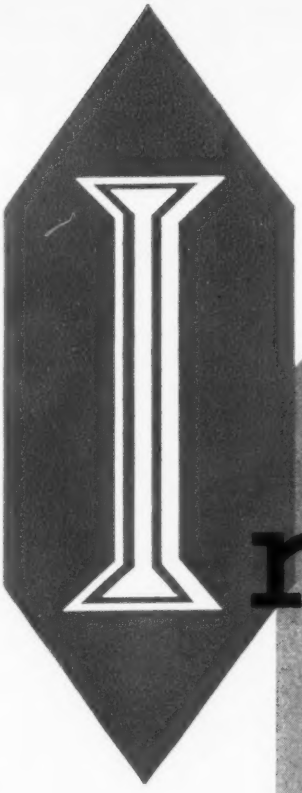

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Impart good processing and extrusion characteristics—minimize temperature build-up and deterioration under repeated impact.

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*Circular 13-52 covers
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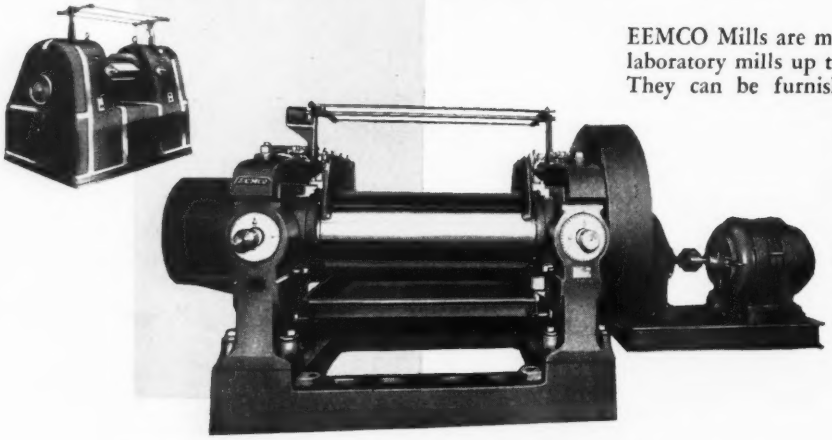
are engineered for your job in STANDARD or CUSTOM units



EEMCO Mills are made in standard sizes from laboratory mills up to and including 84" mills. They can be furnished with any extras you desire, including individual drives, right angle or floor level drives, or for "in line operation."

Consult EEMCO before you buy; call or write us today stating your requirements.

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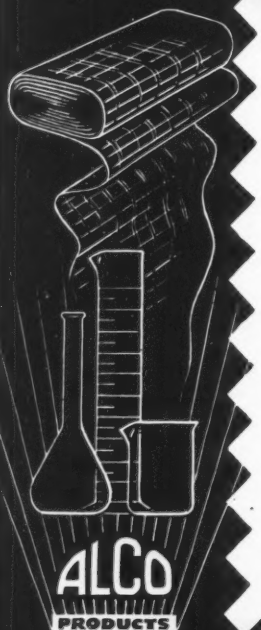

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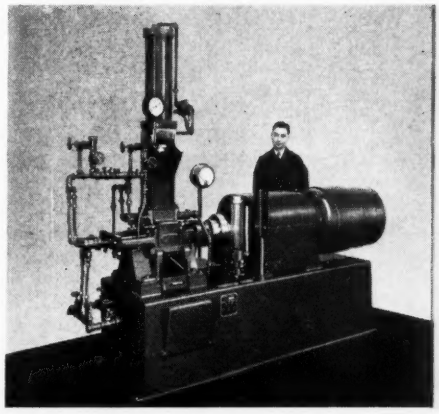
PERMITS WIDE SCOPE OF EXPERIMENTAL WORK... ACCURATE EVALUATION

6″ x 13″ TWO ROLL LABORATORY MILL

Four drive arrangements give wide choice of roll speeds and friction ratios: 1. Single AC motor to give constant roll speeds and 1.4:1 friction. 2. Single AC motor driving rolls through vari-speed sheaves to give variable roll speed and 1.4:1 friction ratio. 3. Two AC motors with vari-speed drives for friction ratios from even speed up to 2.1:1. 4. Two DC motors with variable voltage control for ratios from even speed up to 10:1 friction.

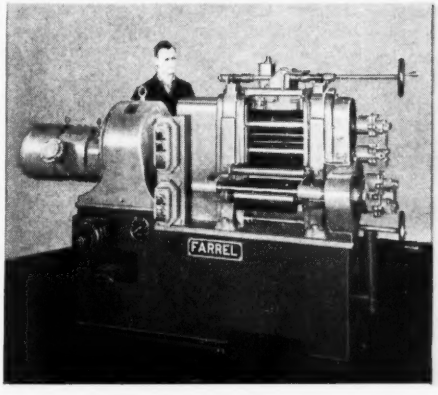
Standard mills have rolls bored for temperature control, self-contained automatic cascade lubrication for operation up to 350°F, swinging scraper and tilting guides. Optional features include chrome-plated rolls, extra hand scraper, air-operated scraper, ratchet roll adjustment, and batch-off roll.



SIZE B BANBURY MIXER

When this laboratory Banbury is equipped with a four-speed motor, as shown in the photograph, the effects of various speeds on different stocks can be readily determined. It has a capacity of 4 pounds of 1.50 specific gravity stock and will produce mixes comparable with those obtained in production size machines. Hence it is easy and economical to translate work done in the size B to a production Banbury, going, for example, from a 4-pound batch in the size B to a 450-pound batch in the size 11, or even a 1,000-pound batch in the size 27.

Entire unit is mounted on a high base of welded steel construction for convenient working height.



6″ x 13″ FOUR-ROLL CALENDER

This four-roll inverted L-type calender is designed to operate with roll temperatures up to 350°F. A 7½ HP, DC, adjustable-speed motor provides a wide range of roll speeds.

Adjustment of the top and bottom stack rolls is by hand-wheels. The side-roll adjusting screws are hand-operated by wrench. Adjustable guides are provided for the top and side roll pair.

All motors and controls, including the safety throwout, are explosion-proof. Brackets are mounted on the delivery side of calender frames to support a cooling drum, idler roll and windup.

Send for further information about this versatile laboratory equipment.

FARREL-BIRMINGHAM COMPANY, INC.

ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

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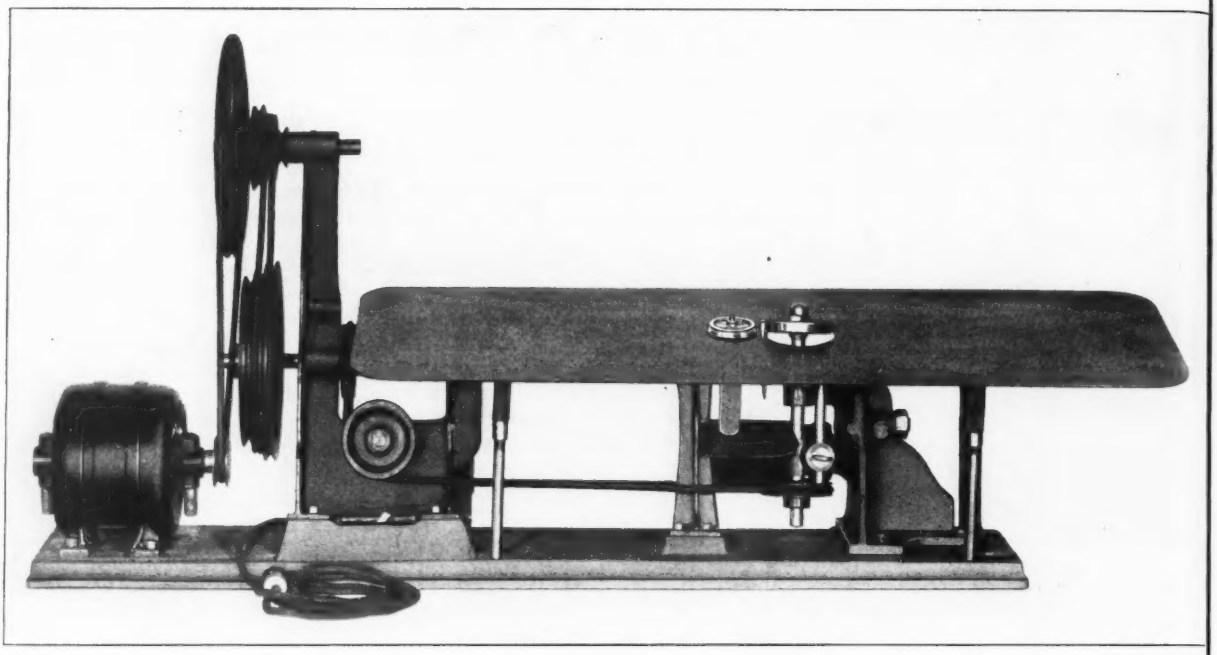
The World's Trimmers



#10 Inside and Outside Trimmer

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Natural and Synthetic

Latex and Latex Compounds

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NOW

made especially for chloroprene base SYNTHETIC RUBBERS

"A plasticizer for every purpose"

ohopex* r-9 plasticizer

Foreseeing the need of a plasticizer for synthetic rubbers with outstanding performance at both high and low temperatures, Ohio-Apex developed Ohopex R-9. It was developed and is produced exclusively by Ohio-Apex.

A PRIMARY PLASTICIZER, Ohopex R-9 is an octyl fatty acid ester. It is completely compatible with low temperature types chloroprene base synthetic rubbers, other types of synthetic rubbers, ethyl cellulose and chlorinated rubbers.

GOOD AGING PROPERTIES at both high and low temperature conditions are imparted to end products with the use of Ohopex R-9.

LONG LIVED TACK in the uncured stock is imparted by Ohopex R-9. According to laboratory tests the uncured stock aged for five weeks at 75°C. loses none of its tack and after eleven weeks the loss is only negligible. An uncured stock with this retention of tack offers many advantages.

LOW TEMPERATURE PROPERTIES imparted by Ohopex R-9 are extremely good with the low temperature types chloroprene rubbers as indicated by a brittle point of −56°C.

THE PERMANENCE of Ohopex R-9 is excellent. After aging (7 days @ 121°C. A. S. T. M. D412—D865) the low temperature brittle point of −56°C. remains unchanged. Other properties imparted exhibit the same degree of permanence.

OTHER OUTSTANDING PROPERTIES produced by Ohopex R-9 are low volatile loss and easy compounding. Its incorporation in a formulation produces no adverse effects on cure.

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Technical literature and samples will be sent immediately upon request without obligation.

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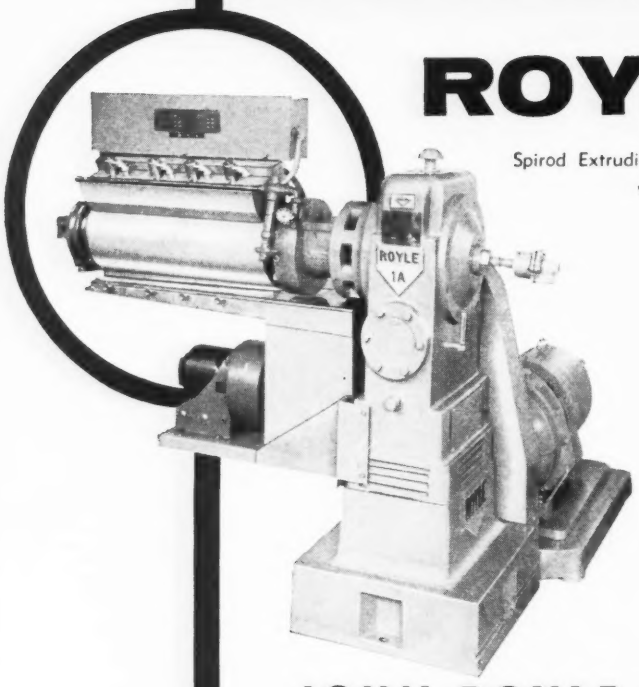

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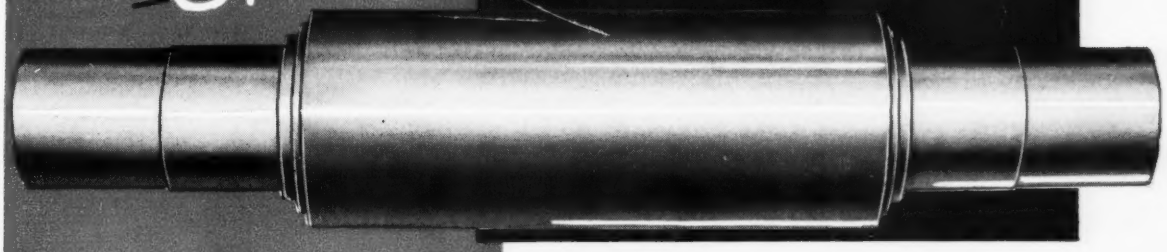

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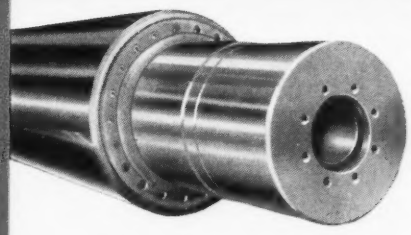

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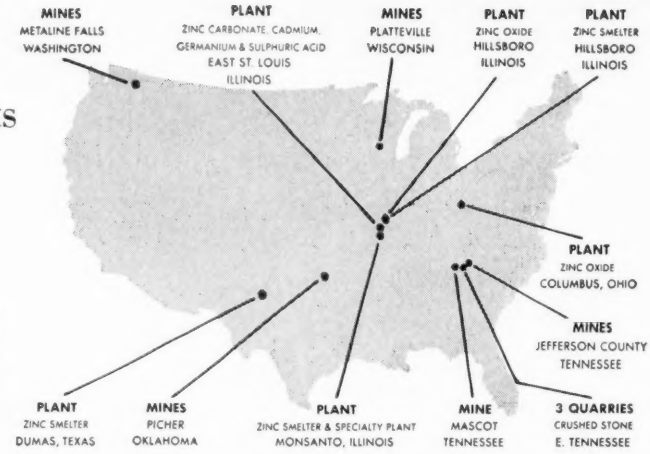

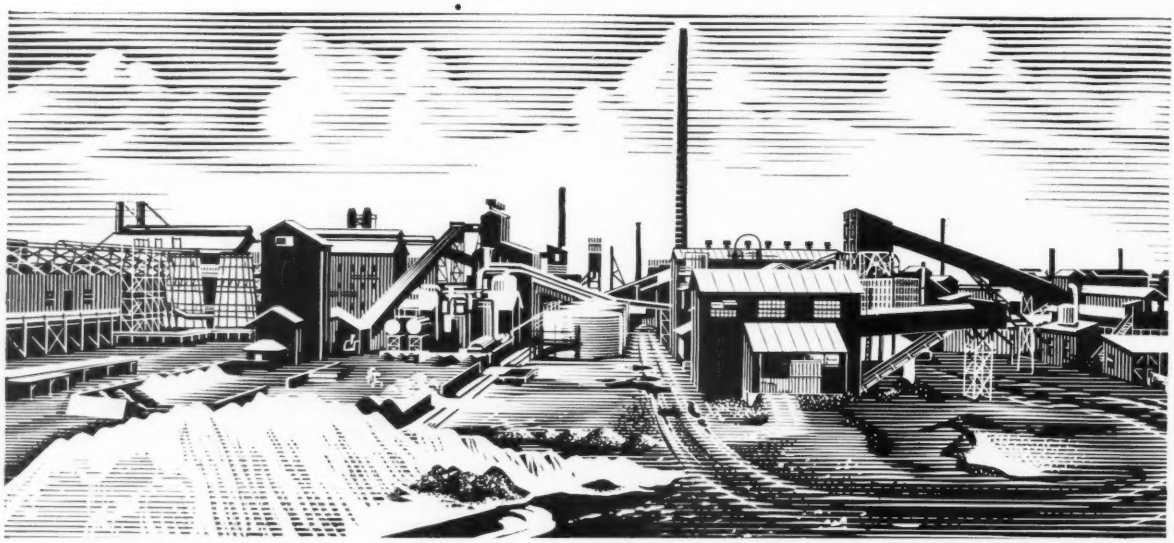

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LONDON

The I.R.I., which was founded in 1921, is now a great association of people engaged in all branches of the Rubber Industry. Its members include rubber producers, manufacturers, scientists, technologists, executives, students and others, in many countries of the world.

It has reached its present position of authority and respect through the high standard it has set for the technical literature it publishes, the diplomas it awards, and the meetings and conferences it organizes.

In collaboration with other Societies, it aims to raise the standing of the Industry throughout the world by improving the technical qualifications of its personnel, extending the study of its raw materials, processes, and products, and by promoting the exchange of technical discovery and information by means of literature, conferences, and meetings.

Membership of the Institution is open to all interested at an annual subscription of $7.50 which entitles the member to receive the bimonthly Transactions free of charge and to purchase other publications (such as the Annual Reports and Monographs) at reduced rates. It also serves to put him in touch with his colleagues and their work in other parts of the world and confers on him full rights to vote, to nomination for election to the Council and to participate in meetings and Conferences organized by the Institution.

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	Parts by Weight
GR-S, 1006	90
High Styrene Resin	10
NEVILLE LX-685, 135	12
Antioxidant	1
Calcium Silicate	50
Hard Clay	200
Zinc Oxide	5
Process Oil	5
Mold Lubricant	2.5
Stearic Acid	1.5
Benzothiazyl Disulfide	1.5
Zinc Dimethyl Dithiocarbamate	0.5
Rubbermakers Sulfur	4
Total	**383.0**

For extremely high hardness, approximately 5 parts of phenolic resin may be added.

Cure: 6 minutes at 310°F.
Specific Gravity: 1.66
Hardness, Shore A: 96
Color: Light Brown
Mold Release: Good
Hot Tear Resistance: Good
Cost per pound (estimated): $.092

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EASE OF PROCESSING
HIGH HARDNESS
ABRASION RESISTANCE

at low cost specify
NEVILLE LX-685,135

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R-56

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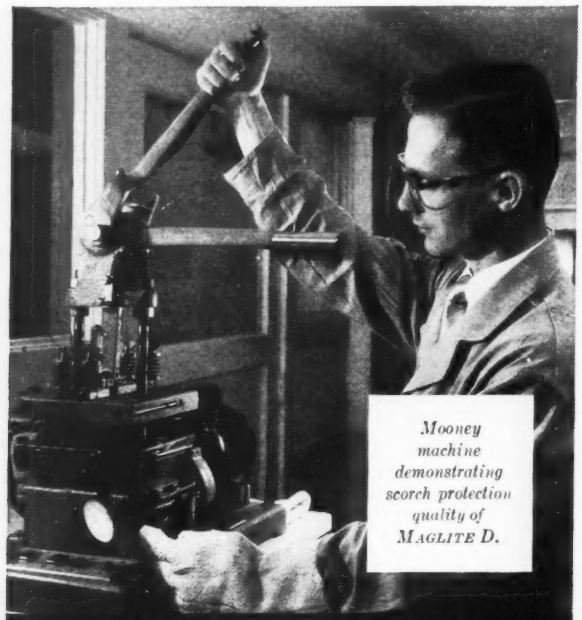

Mooney machine demonstrating scorch protection quality of MAGLITE D.

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Uniformity of chemical and physical characteristics, high scorch protection, and ease of dispersion are desirable characteristics you can always count on when you specify the MAGLITE brand These products are available as MAGLITE M, an extra-light magnesium oxide, and MAGLITE D, a dense compound for minimum storage space.

Merck's basic *magnesium carbonate* is another fine product you can depend on. As a filler and reinforcing agent, it provides unexcelled uniformity and quality.

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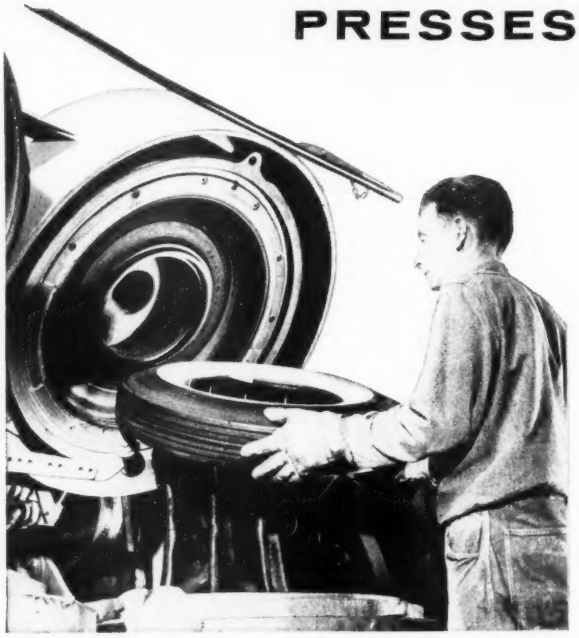

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- Give clean break-away
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- Have no harmful swelling or softening effects on rubber.
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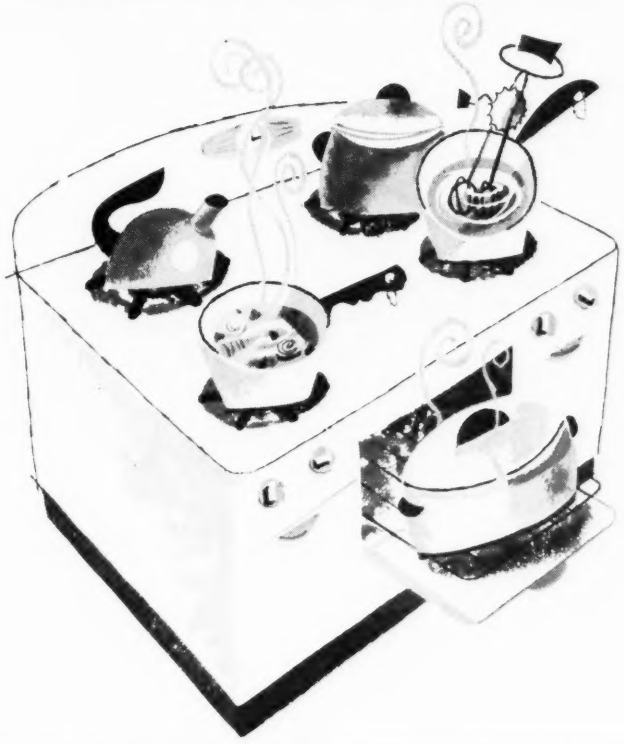

All ready to dish up . . . a great variety of rubber compounds to suit the various tastes of many different mechanical goods manufacturers! PHILPRENE's wide choice of polymers and masterbatches will provide the *special qualities* you want most in your rubber products.

Ask our technical representative for assistance if you have a particular problem with your rubber recipe. We have had decades of experience with rubber. Our know-how, our experience, our technical resources and facilities are at your service. Please feel free to consult us without obligation.

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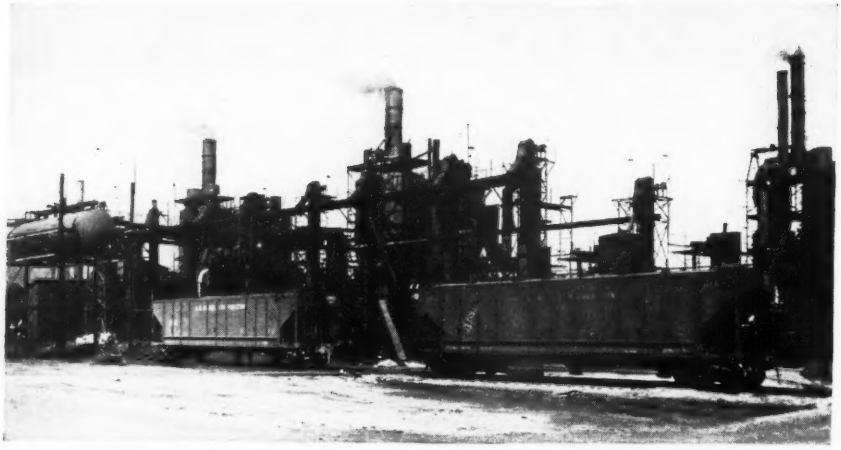
	PHILPRENE 1000 PHILPRENE 1001 PHILPRENE 1006 PHILPRENE 1009 PHILPRENE 1010 PHILPRENE 1018 PHILPRENE 1019	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503 NOTE: PHILPRENE 1019 AND 1503 ARE ESPECIALLY DESIGNED FOR THE WIRE AND CABLE INDUSTRY	PHILPRENE 1703 PHILPRENE 1706 PHILPRENE 1708 PHILPRENE 1711 PHILPRENE 1712
	PHILPRENE 1100 PHILPRENE 1104	PHILPRENE 1600 PHILPRENE 1601 PHILPRENE 1602 PHILPRENE 1605* *Philblack A cold rubber masterbatch	PHILPRENE 1803 similar to GR-S 1801 but incorporating 25 parts Philrich 5

PHILLIPS CHEMICAL COMPANY

Rubber Chemicals Division

318 Water Street, Akron 8, Ohio

Phillips 66



HUBER EXPANDS FURNACE BLACK FACILITIES BY 15 PERCENT

NEW YORK...Plans for the construction of a new unit that will increase furnace black production by 15 percent have been completed by J. M. Huber Corp., it was announced by H. W. Huber, President. The unit will be built at Huber's Carbon Black headquarters at Borger, Texas.

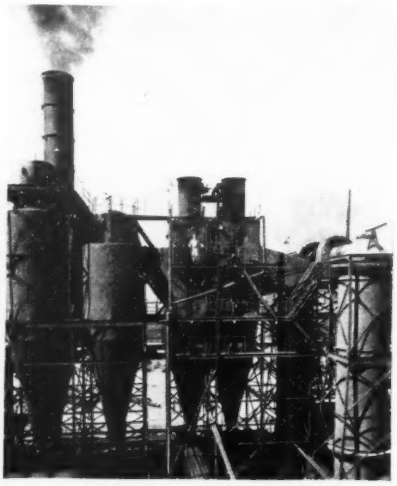
"The new unit," Mr. Huber said, "will have an output of twenty to thirty million pounds of black yearly, depending on the grade produced. This represents an expansion of about 15 percent in Huber's existing furnace black capacity." Huber currently has four furnace black units in operation at Borger and two at Eldon, Texas, in addition to their extensive channel black plant in Borger, Texas, making it one of the world's leading carbon black producers.

Initial production will be of the SRF (semi-reinforcing furnace) type. SRF is used as a reinforcing pigment in tire carcasses, tire sidewalls, V-belts, rubber hose, footwear and motor mounts.

This is the second recent expansion of Huber's furnace black facilities at Borger. A new unit has just gone into production and the currently planned furnace plant is expected to be in full production during the latter part of 1956.

The major raw material used in the manufacture of SRF furnace black is natural gas. Huber draws this important raw material from its own supply in the Texas Panhandle and surrounding areas where it has substantial reserves. By producing its own gas, Huber is one of the few carbon black manufacturers that has complete control over the quality of its product from start to finish.

In its plants at Borger and Eldon, Texas, J. M. Huber produces all of the major grades of channel and furnace carbon blacks. In recent years Huber has become a major factor in producing silica type pigments at its Chemicals Division in Havre de Grace, Maryland. The company is also a leading manufacturer of printing inks with nine plants and service stations supplying the United States east of the Rockies. In addition, Huber is one of the world's largest kaolin clay producers with mines and plants in Georgia and South Carolina. These clays are used in the manufacture of paper, rubber, ceramics and insecticides. The company has over 650 producing oil and gas wells in the Southwest, and manufactures oil field production equipment.



Typical furnace black unit.

Sales headquarters for Huber are located at 100 Park Avenue, New York 17, N. Y.

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RUBBER WORLD

DECEMBER, 1955

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RUBBER WORLD

DECEMBER, 1955

Stability Factors in Rubber Costs Through 1960

The Rubber Manufacturers Association, Inc., at its fortieth annual meeting in New York on November 16 heard five industry executives discuss various means of achieving rubber cost stability and of minimizing pressures exerted on the industry's raw materials cost structure by excessively high natural rubber prices.

We are presenting the five talks herewith in their entirety because of their obvious importance to readers of RUBBER WORLD. As W. J. Sears, RMA vice president, pointed out in his summary, greater stability in rubber costs will develop through a better balance in worldwide consumption of synthetic rubber. The speakers have pointed out the ways in which this improved balance of consumption of synthetic rubber may be achieved. EDITOR.

The Expanding Market for Rubber Products

By THOMAS ROBINS, JR.
Hewitt-Robins, Inc., Stamford, Conn.

DURING the 15 years since the start of World War II, sales of non-tire rubber products have, in the aggregate, increased even faster than sales of tires. This may seem surprising, particularly in view of the fact that tire sales are themselves at levels nearly four times those of the last prewar years.

The fact of the matter is that non-tire rubber sales appear to be running at a rate at least five times the pre-World War II level.

It might be asked, "Why are the words 'nearly' and 'appear to be' used in making these comparisons; are not exact statistics available?"

Our answer must be, "No," mainly because there has been no generally accepted definition of the term "rubber product."

The past 20 years, and particularly the past 13 years, have witnessed the introduction of so many new types of rubber and rubber-like materials, and the utilization of these new, as well as old, materials in such an increasing number of applications in industry and the home that no organization, government or private, has to date succeeded in assembling statistics to keep pace with the expansion of these "non-tire" applications which I have been asked to review for you today.

Let us consider for a moment a definition of the term "rubber product." Few, if any, manufacturing

industries use as many different raw materials in construction as we do. The share of the products of our industry where crude rubber or other elastomers constitute, say 75% of a product, is negligible. Almost always, and to improve the serviceability and utility of rubber, we combine it with fabrics, natural or synthetic; metals; and especially a wide variety of chemicals, which add flexibility, durability, sunlight resistance, age resistance, or other desirable end-product characteristics.

It seems to us, therefore, that perhaps the only definition of the term "rubber product" that would meet the situation would read something like this:

A rubber product is a product in which *the key essential ingredient* (although not necessarily quantitatively predominant) is natural rubber or a rubber-like elastomer.

Most of us in this room have seen the chemically produced elastomer, including, of course, GR-S, neoprene, butyl and N types, the silicone and Thiokol, rise from a negligible share of our raw materials supply to reach, in 1955, a position where natural rubber meets with little over one-third of our key raw-material requirements.

Industry 1939-53 Growth

I mentioned the lack of truly comprehensive statistics on these non-tire rubber products industries. Certain Bureau of Census figures (1953 *vs.* 1939), however, present a picture of growth by our industry which we might examine for a moment.

	1939	1953	% Increase
Non-tire rubber products*			
Mechanical rubber goods	$177,067,000	$1,186,625,000	570
Druggist-medical rubber goods	13,733,000	59,611,000	334
Rubber footwear	43,112,000	188,739,000	338
Other Rubber products	121,907,000	521,795,000	328
Total, Non-Tire Rubber Products*	$355,819,000	$1,956,770,000	450
Tires and tire repair materials*	$522,876,000	$1,901,312,000	264
Grand Total All Rubber Products*	$878,695,000	$3,858,082,000	339
Non-tire share of rubber industry	40%	52%	
Gross national product	$91,000,000,000	$364,000,000,000	300
Federal Reserve Board Index of industrial production (based on 1947-8-9=100)	58	134	131
Population	131,028,000	159,629,000	22

* United States Census Reports.

As to the sale of non-tire *rubber* products, the business has grown from a business of less than $400 million in 1939 to just about $2 billion in 1953, exceeding tire sales by more than $50 million.

To point up the exceptional growth factor in the non-tire rubber business, some important segments of the non-tire rubber industry have far out-distanced the indices to which one might assume they would be related. For example, foam rubber manufacturing, perhaps the lustiest child in our industry ($200 million sales this year), is running about 20 times its rate only 10 years ago; and heavy industrial products, conveyor belting and the like, have grown six times in the same period. As against these figures, the Federal Reserve index of industrial production is less than three times its prewar rate, and the population of the United States is up only about 25%.

Only the index of *gross national product*, which is about four times its prewar figure, comes even close to approaching some of these remarkably popular new products of ours, in their gain in sales.

As far as we can see, there is no reason to expect a reversal in this basic trend. In other words, our business should grow at least as fast as the gross national product and well ahead of the average of all industry.

This is a fine prospect. There is one all-important factor, however, to be watched in our future. The very latest statistical forecasts indicate that there will be no greater production of natural rubber in the years ahead than is currently available; a few tons, perhaps, but at the most about 5% additional by 1960.

More Synthetic Rubber Required

Should our sales increase, over the long term, with the same trends evidenced in the past 10 years, we will just have to use more synthetic rubber and other elastomeric materials.

The synthetic rubber plants are now in the hands of private industry. Primarily because of the excellent disposal pattern worked out by the Pettibone Commission, everyone who uses the synthetic materials has a fair shot at the increasing supply available. Although the producers of synthetic may not yet have fully rounded out their technical sales organizations and made available to the smaller user the full benefits of cooperative development effort, these programs are going ahead, and we have no doubt but what more and better synthetics and elastomeric materials, and advice on their use, soon will be available to all the many segments of the industry.

Ratio Tire/Non-Tire Products Change

It is now apparent that again in 1955 dollar sales of non-tire rubber products will slightly exceed those of tires. At least 1,000 companies participate in these latter non-tire rubber products industries. The record for the past decade shows these companies, in the aggregate, to be the fastest growers in our industry. It is probably not far out of line to suggest that 10 years from now they will be doing two-thirds of the rubber products business, reversing the prewar position when tires accounted for two-thirds of the industry. To do so, however, their growth must be built, not on increased supplies of natural rubber, but on the synthetic materials, which for these many specialized industrial and consumer uses are far superior, it not indispensable, to any rubber products manufacturer. Moreover, greater relative usage of chemically made elastomers promises stabilization of cost to an extent unlikely of achievement with usage of natural rubber.

Rubber Requirements, 1955 through 1959

By G. O. TRENCHARD
Firestone Tire & Rubber Co., Akron, O.

MY PART in these discussions is to present the current and prospective supply-demand conditions in the rubber market. This information provides a good background for several of the more complicated questions to be dealt with by Spencer and Keener. To this end you have been supplied with a table, "World Rubber Position—Potential Supply *vs.* Demand, 1955-1959." For purposes of simplicity you will note that the rubber estimates contained thereon are confined to only the two broad types of rubber, natural and synthetic.

WORLD RUBBER POSITION—POTENTIAL SUPPLY VS. DEMAND, 1955 - 1959

(Thous. of Long Tons)

	1955	1956	1957	1958	1959
DEMAND					
U.S.A.					
Natural	627	....	....	....	....
Synthetic	878	....	....	....	....
TOTAL	1,505	1,480	1,485	1,525	1,570
Foreign					
Natural	1,241	....	....	....	....
Synthetic	155	....	....	....	....
TOTAL	1,396	1,500	1,650	1,735	1,800
World					
Natural	1,868	....	....	....	....
Synthetic	1,033	....	....	....	....
TOTAL	2,901	2,980	3,135	3,260	3,370
SUPPLY					
U.S.A.					
Synthetic—planned capacity	958	1,190	1,350	1,400	1,450
Foreign					
Synthetic—planned capacity	110	125	150	225	300
Natural—potential	1,850	1,875	1,900	1,925	1,950
TOTAL	1,960	2,000	2,050	2,150	2,250
World					
Synthetic	1,068	1,315	1,500	1,625	1,750
Natural	1,850	1,875	1,900	1,925	1,950
TOTAL—POTENTIAL	2,918	3,190	3,400	3,550	3,700
SURPLUS—POTENTIAL					
Natural and synthetic	17	210	265	290	330

The data on this table have been prepared for this meeting. The figures are averages of estimates that have been gathered from sources available to me in this country and abroad. These data are not official, but to my knowledge they do reflect the thinking and analysis of well-informed people.

Turning now to the table, you will note that this year's very tight supply-demand situation is scheduled to give way to an abundance, or perhaps surplus, of rubber in the next year or two. This basic change in supply-demand conditions, however, is predicated on a number of "ifs" which may or may not materialize. First, take account of the situation in natural rubber. The production estimates of responsible people in this country vary from 1,800,000 to 1,900,000 tons for the next few years. Information from natural rubber producing countries indicates that 1959 production could be as much as 1,950,000 tons. This is interesting because these people, being very conscious of prices, have a tendency to understate production. This is quite an honest difference of opinion.

Second, the increases in synthetic rubber supply are largely estimates of planned capacity. Being estimates, they are subject to considerable change should circumstances warrant. For example, if natural rubber prices become competitive, some of the synthetic expansion program may be delayed or slowed down. Mr. Spencer will no doubt cover this matter and, I hope, the problem of feed stocks to supply the new copolymer plants, a very important factor in the expansion program.

A third "if" or reservation which you should bear in mind in analyzing the table is an historical one. In 1910, rubber consumption in the United States was 42,200 tons; in 1920, 206,000 tons; in 1930, 376,000 tons; in 1940, 651,000 tons; in 1950, 1,258,600 tons. In other words, rubber consumption in this country has nearly doubled every 10 years for the last four decades. The estimate of consumption in 1959 is 1,570,000 tons, which is little changed from 1955 consumption and only 24% above the 1950 figure. This would appear to be an unexpected and unusually drastic slowdown in the rate of growth in our rubber industry, particularly in view of the favorable business conditions that have prevailed and are expected to prevail in the rest of the current decade. Should U.S.A. consumption be up as much as 50% by 1960, there would have to be a greater expansion in synthetic rubber facilities than is now planned.

In this connection you may be interested to know that several outstanding rubber experts in Europe believe that estimates prevailing in this country on U.S.A. rubber consumption over the next five years are too conservative.

Furthermore, when you compare the estimated increase in rubber consumption in foreign countries of some 400,000 tons by 1959, as shown in the table, with a 65,000-ton increase projected for the U.S.A., the U.S.A. increase in consumption appears quite conservative.

Attention is called to the U.S.A. consumption estimate for the next several years because estimating errors in the last few years have been largely in being too conservative on the forward picture. This, of course, is understandable, because the farther you look into the future, the more difficult it is to visualize the actual conditions that may prevail.

Natural Rubber Supply, 1955-1960

By W. E. CAKE
United States Rubber Co., New York, N. Y.

THERE are approximately 11¼ million acres planted to rubber throughout the world. Of this total 94% is in the Far East, and 75% is in the two principal producing countries, Malaya and Indonesia. It will be convenient, therefore, to consider our subject in three main divisions: Malaya; Indonesia; and the rest of the world.

Malaya

About 60% of the Malayan production comes from large estates—those of more than 100 acres in size. The balance comes from what are now termed smallholders. The large estates reached their maximum output in 1948 and then declined for two years. Since 1951 estate output has been on an upward trend and is expected to surpass the old high by 1957.

Estate replanting is at the rate of about 3% of the planted area per year. About 60,000 acres were replanted in 1955, and a total of 352,000 acres since the war. Continued replanting at this rate should keep these properties completely rehabilitated. The yield on the new plantings is estimated conservatively at 1,600 pounds per acre, as compared with 315 pounds on the old seedling areas and an average of 850 pounds on the present selected areas.

The Malayan smallholders reached their peak production in 1950 and have been declining since then. I do not think their replanting rate will average much better than 2½% of the planted area per year. Only 71,000 acres have been replanted since the war, including 40,000 acres in 1955. On this basis, the smallholders' output will continue to recede till 1961 or 1962.

Looking at the Malayan picture as a whole, a modest gain in output over the next several years appears likely. Furthermore, the economic position of the industry there will be vastly improved and its eventual survival is certainly protected by the policies now being followed. This favorable situation is largely the result of the subsidy which the Malayan government has placed on replanting.

Indonesia

Now let us look at Indonesia. Large European-owned estates there did not reach their maximum postwar production until 1953. Since then output has been roughly on a plateau. Unlike Malaya, rehabilitation in Indonesia has been slowed by the unfavorable political climate and by the various uncertainties regarding land tenure, labor, and security conditions.

For these reasons replanting has been on a minor scale and seems likely to continue that way. I think the Indonesian estate output will probably continue to recede slightly in the next several years, but not below 250,000 tons per year.

Indonesian smallholders really cashed in on the Korean boom. Production skyrocketed, exceeding 60,000 tons a month several times. The 1951 total was 592,000 tons. It is perhaps significant that the high output was not repeated in 1955, when prices again zoomed.

When the price went down, output declined drastically, and there does not seem to be any likelihood of a revival in this segment of the industry. The smallholders have been offered no incentives to replant, and no replanting is being done.

There is some support for the view that consumption of bark has been relatively light in large sections of the Indonesian smallholders' plantings. This is thought to insure continued high potential output of these plantings. It is a debatable point, and my own experience and observation do not support it, but it is an intangible that must be considered.

My own guess is that the Indonesian smallholders' output will continue to decline indefinitely from here on. By 1960 their annual volume may be well under 400,000 tons, compared with 460,000 tons this year.

I think the total Indonesian production, which ran over 800,000 tons in 1951, will be about 740,000 tons this year and 725,000 tons next year, and will taper off to about 650,000 tons by 1960.

Other Producing Countries

Aside from Malaya and Indonesia, the rest of the world includes a number of areas producing rubber in quantities varying from moderate to very small. Nearly all of them have the problem of obsolesence, and some have political problems as well. In Ceylon, a replanting scheme has been in effect in a small way for several years. It is now being stepped up, and the indications are good. After some moderate recession, output should be pegged at from 90,000 to 100,000 tons a year.

Plantings in Sarawak, Borneo, and Thailand all need to be modernized. Not much is known about them, but we can assume that enough progress is being made to keep output up to present levels.

In Viet Nam and Cambodia the rubber areas are in the southern region. They are not entirely insulated from the Communist threat, but they are a good distance away from it at present. The estates are in good shape and should continue to produce at a high rate for several years to come.

In Africa, the Liberian plantations have continued to register new highs in output. I expect that 50,000 tons of rubber per year is in sight by 1960.

The Belgian Congo has nearly 200,000 acres planted to rubber. All of it is modern, and production has been coming up at a rapid rate. It should reach at least 25,000 tons this year and could easily double by 1960.

British Africa is in a similar position, with more than 250,000 acres in Nigeria alone, and new plantings coming in all the time.

In the Western Hemisphere two major problems face natural rubber output. One problem is the South American leaf blight, which seems likely of solution in the not-to-far-distant future as a result of a joint research program which has been carried on by the United States and several Latin American countries for several years. The other is labor cost and supply.

In any case, consumption of rubber in Latin America is growing at a faster rate than natural rubber output in that area, so that Latin America will continue to import on balance throughout the period we are discussing.

Summary and Conclusions

As you review the recent history of world rubber production, I think you will be impressed by the fact that output reached its peak in 1950. Its basic trend has been downward since then, and recoveries induced by high prices, such as we have had this year, have not equaled the old high.

The recently developed hormone treatment for stimulating the yield of existing stands may possibly be able to raise estate production, or at least stabilize it at its present level, if it proves successful and if it is widely adopted. That is another unknown factor which is difficult to judge at the present moment.

On a world-wide basis I think the best we can expect is a relative stability in output between 1,800,000 and 1,900,000 tons a year until 1960. Beyond that, we should have a moderate annual increase in volume—at least enough to permit the natural rubber industry to meet a fair share of the world's total requirements.

Synthetic Rubber Supply, 1955 through 1960

By L. E. SPENCER
The Goodyear Tire & Rubber Co., Akron, O.

YOU have heard my distinguished colleagues speak. They have clearly established the cases for (1) the future market for the products of this industry, (2) the resulting raw material requirements for the next five years, and (3) that portion of those requirements which may be met through full consumption of the anticipated quantities of natural rubber, which under the best circumstances, may be available during the next five-year period.

I should not wish to burden a most intelligent audience, consisting of executives from several of the most dynamic American industries, with obvious answers as to "how the differential between anticipated total new rubber demand and the supply of natural rubber will be met." Most of you know the answers to this question even better than your humble speaker.

Future Synthetic Rubber Supply Viewed Optimistically

Plans already have been announced for major expansions of the synthetic rubber industry both in the United States and in certain foreign countries. Additional expansions may be anticipated from time to time as increasing demand justifies even further expansions.

In addition, it seems certain that the one facility remaining in government hands—now in standby condition—will soon be sold and reactivated. I have in mind, of course, the plant at Institute, W. Va. This plant alone represents the difference between a tight supply and an adequate supply situation.

Where I use the term "synthetic rubber" capacity or "synthetic rubber" expansions, throughout my talk, they embrace all aspects of capacities or expansions required to produce butadiene-styrene type synthetic rubber, i e., copolymer facilities, butadiene and other facilities plus availability of the required raw materials.

Before we delve into the future supply situation too deeply I believe it would be appropriate to compliment and pay tribute to the three great industries—petroleum, chemical, and rubber industries—for the marvelous accomplishments they have achieved during recent months in the production of record quantities of a very basic raw material. Have you allowed yourselves the unpleasantness of contemplating the probabilities of the supply situation that undoubtedly would have existed today under continued government operation of the synthetic rubber industry?

Even record performance during the last several months has not made it possible to avert tight supply situations entirely. There is a *short-term* problem in supplying every customer—and nearly every customer's requirements are at record levels—with desired quantities of exact types of materials as needed. This problem requires the fullest understanding, cooperation, and teamwork between all customers and suppliers.

Barring major catastrophies or unanticipated interruptions in production, I feel certain that existing facilities can and will meet the record demands now faced by the industry. As soon as the Institute plant and/or the expansions already announced become operative, our worries with respect to an adequate supply of syn-

thetic rubber will be history. Meanwhile, economic serenity and even the security of the United States and of the Free World rest with Providence.

Synthetic-Capacity Increase Time Table

At this point, I cannot refrain from reminiscing a bit. History, as you know, is valuable only to the extent that a study of events of the past may serve as a guide toward achieving a better future. In this connection you may remember that I had the honor of participating in the last RMA annual meeting, at which time I made several pertinent observations regarding the plans of private industry for the future production of synthetic rubber. Those remarks were predicated upon the probability that *private industry* would assume the responsibility for supplying the nation's needs of synthetic rubber upon the successful culmination of the government's Disposal Program—an event which became effective at the end of April of this year.

I beg your indulgence in several quotes from those observations:

"We anticipate that all facilities which are now in operation will continue in operation. The level of operation of these facilities is expected to fluctuate in accordance with the demand for these raw materials." (Correct.)

"Inventories will undoubtedly be maintained at a somewhat higher level in total than has been the practice of the government." (Impossible to date.)

"When and if the demand warrants, it is expected that additional capacity will be undertaken in exactly the same manner as additional capacity is provided by private industry for all other products." (Correct—refer to announcements.)

"In order to provide local service, especially to small quantity customers and on specialty types, it is quite likely that sales agents and inventories will be established throughout the country." (Correct.)

"It is expected that the government, while it remains in business, will maintain a normal two months' inventory which may be utilized to bridge the gap between the transfer dates and the time when producers and consumers will have established regular commercial relationships directly between themselves." (Disregard advice—reason for present expensive difficulties—economy paying for it.)

"However, in addition to this safeguard, it would seem advisable for all consumers to increase their own inventories to the maximum extent practicable in advance of the transition date, particularly on low volume and specialty types." (Some did; some did not—and have lived to regret it.)

"Research, directed toward the development of new and superior formulae of synthetic rubber, will be expanded sharply under the stimulus of private enterprise and genuine competition." (Correct.)

Knowledgeable persons may judge for themselves the extent to which private industry has executed its responsibilities regarding the points mentioned above, during the 6½-month period since the Disposal Program became effective.

I have already mentioned, and you are aware of the unprecedented, and I might say unforeseen, demand for synthetic rubber during the current period. Even this situation is being met without any great difficulties, thanks to the understanding and teamwork both of producers and consumers. Barring major catastrophies, there is no doubt that the synthetic rubber supply situation will ease just as soon as expansions now under way come into existence and/or the output of the Institute plant becomes available.

Furthermore, inventories will be built up at the earliest opportunity to not less than 2½ to three months' national position.

Capacity of GR-S type rubber is anticipated to increase from the government rated figure including Institute of 856,000 long tons early this year to more than 1,100,000 long tons by the end of 1956 and progressively to 1,250,000 long tons annually (including oil) by 1960. The current record levels of production are in close balance with the availability of butadiene.

Consideration might well be given to lessening the ratio of butadiene in favor of additional styrene, which is in plentiful supply, by both consumers and producers. In addition, increased usage of oil-extended formulae will immediately increase the availability of this basic raw material. Other types of special-purpose synthetic are expected to increase similarly so that by 1960 the United States will have an overall capacity of synthetic rubber materials over 1,500,000 long tons annually.

It is known that Canada, England, Germany, France, Italy, Japan, and perhaps Brazil and South Africa contemplate expanded or new facilities by that time. The inescapable fact is that unless and until foreign countries convert to synthetic in at least moderate proportions, pressure will continue on prices for natural rubber to the entire world's disadvantage. As a practical matter, further conversion in the U. S. becomes increasingly difficult as the percentage of synthetic further rises; whereas moderate conversion abroad should result in an actual improvement in quality, i.e., passenger tire treads, small trucks, camelback, certain industrial products, etc.

Continued Synthetic Price Stability Seen

A discussion of the future role of synthetic rubber usage and supply would be incomplete unless the interesting subject of price is mentioned. When a spokesman approaches this topic, his motives are frequently misinterpreted, and I therefore proceed with caution.

Whether the current prices of the various kinds of new rubber are proper or too high or too low are subjective judgments made by producers, traders, and consumers bargaining in a free market.

Nevertheless the price of synthetic, quite unlike the price of natural rubber, has, with minor exceptions, remained constant at commercial levels for nearly four years. While price changes in raw materials, labor, and other cost items may cause some adjustments in the prices at which GR-S types of rubber are marketed in the future, such changes are likely to be minor, and of little significance to the fundamental economic relations between the prices of synthetic and natural rubbers.

Stability of prices of synthetic rubber has accelerated its capture of a sizable and constantly increasing portion of the new rubber market. With due attention to quality and research—and prices—it is destined to continue this growth trend.

Viewing the world as a whole, synthetic rubber production in 1955 will be equivalent to 38% of consumption. For the United States alone, the comparable figure is 68%. By 1960, world capacity of synthetic rubber is expected to be equivalent to 53% of consumption. For the United States alone the comparable figure is 94%.

The interpretation of these figures, of course, is subjective, but their import seems quite clear to me. The United States will be in position to, in effect, *exchange* materials with the rest of the world to the extent that producers, both here and abroad, make and market a competitive product.

For these reasons, the future supply-position of synthetic rubber must be viewed with the greatest optimism.

Distribution and Use of Synthetic Rubber In World Markets

By J. WARD KEENER

The B. F. Goodrich Co., Akron, O.

THE gentlemen who have preceded me have demonstrated clearly—

(1) That we shall see a large continuing growth in the demands for rubber products in the United States and in the world at large;

(2) That to fill these demands there will be an important expanding need of raw rubber;

(3) That, because of the low level of new planting and replanting of natural rubber, and the long time required to bring new trees to mature production, little, if any, of the large additional needs of new rubber for the next five years can be satisfied with new natural rubber supplies; and

(4) That there *will* be sufficient total new rubber to meet any potential needs because privately produced man-made materials will fill the gap.

Natural Price Fluctuations, 1950-1955

In 1955, manufacturers and consumers of rubber products have been taken for another dizzy ride on the crude natural-rubber-price roller coaster, with very long rises and very brief dips. The only consolation that we can have lies in the fact that we did have man-made materials to cushion the shock. The less fortunate rubber products manufacturers and consumers outside of the U. S. A. and Canada, having little synthetic rubber, had to buy two tickets for the ride. However, when the speed of your ride is so fast that you can't breathe, it doesn't help much to know that your neighbor is riding twice as fast. You'll both suffocate.

Since we've had man-made rubbers in this country, we have come to know them as being sufficiently flexible in their uses to serve as partial governors on the price of crude natural rubber. If crude prices were lower than synthetics, we would switch many uses to crude; if they went higher than synthetic prices, we would switch back to the man-made materials.

That is what did occur when the Korean crisis hit in the Summer of 1950. As rapidly as government production of man-made rubbers permitted, and with the institution of specification controls, we switched from a use level of 46% man-made rubber in 1949 to a level of 65% by July of 1952. Then, with controls off and crude rubber prices declining from the 31¢ level of July, 1952, we started switching back again. Our usage of man-made American rubbers declined to a ratio of about 50% by May, 1954, based on the approximate 20¢ price for crude rubber that had existed when we were buying for May consumption two to three months earlier.

At this point crude prices started up again, and, with only minor downswings, they have been up ever since. As you know, the No. 1 RSS price reached a high monthly average of 48¼¢ in September, 1955, just a few weeks ago. With this excessive rise of crude prices, the big switch to man-made rubber started in the other direction once more. The consumption of man-made rubber climbed as supplies became available and as specification changes could be made to an average level of about 60% of total new rubber consumption in the months of August and September, 1955. Now, industry has temporarily stopped further conversion to synthetics because we are using the full present capacity of the American man-made rubber industry.

During these past months of high crude prices, and contrary to the hopes and predictions of crude natural rubber producers, the private owners of the American man-made rubber industry have made no significant changes in the selling prices of their materials from the previously established government ownership levels. This is competition at work. But because *total* world supplies of new rubber—crude plus man-made—have been so nearly in balance with world rubber consumption requirements, and because Far Eastern speculators have not been slow to take advantage of this world position,

the rubber industry has had to pay, and pay dearly, in the crude natural rubber area.

Let's see what the excess cost of crude rubber over general-purpose synthetic has been to American rubber manufacturers and their customers in 1955. Based on an estimated U.S.A. crude rubber usage of 620,000 tons in 1955, and an average all-grade receipts cost of 35¢, the price penalty is at least $150,000,000. For each 1¢ increase in crude costs based on a 58% usage of synthetic, you can add another $14,000,000. At an average cost of 46¢, for example, the penalty would be more than $300,000,000.

Future Price Stability Factors

Thus we have all been caught on a very *high priced* roller coaster. Our job for today and for the future is to get out of the position we now find ourselves in, and to make sure that the 1955 crude rubber price situation does not repeat itself. How do we go about doing this job, and what are the elements that might help us?

First, the present tight synthetic-rubber-supply position is *temporary*. It is occurring during the last half of the year when crude rubber production is somewhat in excess of consumption. Further, we estimate that U.S.A. crude rubber consumption in the first half of 1956 will be 35,000 tons lower than in the comparable period of 1955—and that it will be 65,000 tons lower than in 1955 for next year as a whole. Expansions of synthetic rubber capacity now under way will be coming in progressively throughout 1956 and should come in rapidly enough to take the edge off any temporary tightness in crude rubber supplies that might occur and of speculative activity based thereon.

Second, above and beyond the *currently announced* expansions in man-made rubber capacity, other expansions will be undertaken as each synthetic rubber producer seeks to improve his market standing. I firmly believe that, before 1957, we will achieve the enviable state of not again being in a short position in *total* new rubber supplies.

Third, each manufacturer of rubber products, realizing that his growth over the next decade depends solely upon increasing supplies of man-made rubber, must *redouble* his efforts to switch to continuously higher percentages of man-made rubber consumption. This will be a constant challenge to the technical staffs of all manufacturing companies. In their efforts they can get assistance from a new group of technicians—the sales service engineers now being added to the forces of the producers of man-made rubbers. No manufacturer should hesitate to call upon his synthetic rubber suppliers for such help.

Fourth, competition among the producers of man-made rubbers will make itself felt in research and development to the extent that improved and new rubber polymers will be produced to assist in building large and permanent markets based on quality advantages, as well as cost. Already, improved synthetics have been announced, and others are undoubtedly on the way. In addition, the new *synthetic natural* rubber appears to be able to perform as well in substantially all respects as natural crude rubber and at prices that are more than competitive with 1955 crude rubber prices. This offers an extremely bright hope for the future.

Fifth, foreign manufacturers of rubber products have grown to an extent that in 1955 they are consuming more than 48% —nearly half—of the world's *total* new rubber. But their ratio of new rubber consumption by *types*—leaving out Canada—is still only about 8% *man-made* rubber to 92% *crude* natural rubber. This results in spite of the fact that the new private American producers of man-made rubber immediately started exporting their materials to an extent now estimated, along with Canadian exports, to be about 15,000 tons a month.

Increased Foreign Synthetic Use Urged

Consequently, in export markets for rubber products, foreign rubber products manufacturers are at a distinct disadvantage in 1955 as against their American and Canadian competitors, who are using 50 to 60% and more of substantially lower-cost man-made rubbers. These foreign manufacturers are conscious of this situation, are anxious to correct it, and are taking steps to do so. Where today, outside the Iron Curtain, there are no significant producers of synthetic rubbers except the U.S.A. and Canada, we can look forward, within the next two to three years, to substantial local production of such rubbers in the United Kingdom, West Germany, France, Italy—and, perhaps, Japan and one or two other countries.

In the meantime the U.S. and Canadian capacities for producing man-made rubbers will expand substantially. It is in our self-interest, from the standpoint of the world effects on natural crude rubber prices, to assist foreign manufacturers by selling them supplies of man-made rubbers and by teaching them how to use them successfully, both in terms of quantity and of quality.

This should not be hard to do. Of a list of 127 tire manufacturing plants outside the U.S.A. which were reviewed recently, 71 that account for perhaps one-half or more of the new rubber consumption outside the U.S.A. were either subsidiary companies, associated minority ownership companies, or technical assistance contractors of U.S.A. manufacturers. As soon as synthetic supplies become available, the help which can be given these companies by American companies represented in this room can stop, for once and all, the roller coaster rides the speculators have been taking us on since there was first a rubber products manufacturing industry.

These remarks are directed at stimulating us to do those things that should come naturally in our competitive American way of doing business. They should not be interpreted as a premature obituary for the natural crude rubber producing industry. With the high-yielding strains of clonal crude rubber now available, there is no man-made rubber yet in sight which can match crude's potential cost of production. There should continue to be an important and profitable market position for efficiently produced crude rubber—but, if we do our jobs at home and abroad, there should never again be

(Continued on page 388)

Ultra-Violet Examination of Oils Used In Masterbatching Rubber Polymers[1]

By D. PREM and J. DUKE

University of Akron, Government Laboratories, Akron, O.

Ultra-violet absorption spectra are presented for a series of processing oils and their fractions obtained according to the Rostler Method and the Eby Chromatographic Method. These spectra offer a means of characterizing the oils, and they show that commonly used rubber processing oils differ considerably in structure or quantity of absorbing components, or both.

RESULTS of previous work[2] have indicated a correlation between the composition of the oils used in masterbatching, particularly with the aromaticity of the oils, and polymer breakdown during heating of oil-polymer masterbatches. As ultra-violet absorption spectra have been used in the analysis of petroleum products and their components, such spectra seemed to offer a means of characterizing some of the commonly used processing oils with regard to the nature or quantity of their components, and, thereby, the degree of activity of the various oils and their fractions as separated by both the Rostler Method[3] and the Eby Chromatographic Method.[4]

Hersh[5] and Adams,[6] among others, have used ultra-violet absorption spectra in the range from 240 to 340 mμ in analyses of petroleum products, and Kurtz[7] reports the presence of several aromatic nuclei whose spectral bands occur in the vicinity of 260 mμ, as shown in the book by Freidel, *et al.*[8] Therefore the wavelength range from 240 to 320 mμ was selected for the present work.

Experimental Procedure

Three oil samples: namely, concentrated nitrogen bases, second acidaffins, and a mixture of first and second acidaffins which had been received from the Golden Bear Oil Co., and a series of ten processing oils of varying aromatic content were selected for obtaining the ultra-violet absorption data. By using a Beckman Model DU spectrophotometer, the absorbencies of these oils were determined in the range from 215 to 320 mμ. Absorbency is the negative logarithm of transmittancy; the latter is a measure of the intensity I of the light transmitted by the material, as compared to the intensity I_o of the incident beam:

$$\text{Transmittancy} = T = I/I_o$$
$$\text{Absorbency} = A = \log_{10} I_o/I$$

Measurements are made with an arbitrary assignment of 100% transmission to the intensity of light transmitted through the solvent alone.

Absorbencies 215-320 Mμ Determined

Absorbencies in the range from 240 to 320 mμ were determined at 2-mμ intervals on solutions having concentrations of 0.016-gm/liter and using a mixture of 85/15 methyl cyclohexane/ethanol by volume as solvent. Throughout this work a stock solution was prepared consisting of at least 0.16-gram of oil weighed and diluted to 100 milliliters with the solvent in a volumetric flask, and the desired concentrations were obtained by pipetting the necessary aliquots into volumetric flasks and diluting with the solvent to volume.

Because the increase in magnitude of the absorbency between 250 and 240 mμ indicated the presence of a second maximum at a wavelength lower than 240 mμ, the absorbencies were then determined in the range from 215 to 250 mμ. Methylcyclohexane is not a suitable solvent for use in testing at the lower part of this range; therefore, n-heptane was used. To determine the extent of displacement caused by the use of a different solvent, absorbencies between 240 and 250 mμ were determined; solutions in both solvents were used. While some difference is apparent, it is, in general, negligible. The concentration used previously resulted in absorbencies which were higher than can be determined when used in the lower wavelength range. At these wavelengths, therefore, the concentrations were varied between 0.008 and 0.016 to keep the absorbencies below 1.0.

To determine whether deviations from Beer's law occurred with these solutions, absorbencies of solutions of four different concentrations, varied in consideration of the magnitude of the absorbency of each oil, were determined at 10 mμ intervals and plotted against the

[1] The work discussed herein was performed as part of the research project sponsored by the National Science Foundation.

[2] W. K. Taft, J. Duke, R. W. Laundrie, A. D. Snyder, D. C. Prem, H. Mooney, *Ind. Eng. Chem.*, 46, 396 (1954).

[3] F. S. Rostler, R. M. White, *Ibid.*, 46, 610 (1954).

[4] L. T. Eby, *Anal. Chem.*, 25, 1057 (1953).

[5] R. E. Hersh, M. R. Fenske, H. J. Matson, E. F. Koch, E. L. Booser, W. G. Braun, *Ibid.*, 20, 434 (1948).

[6] N. G. Adams, D. M. Richardson, *Ibid.*, 23, 129 (1951).

[7] S. F. Kurtz, Jr., C. C. Martin, India RUBBER WORLD, 26, 495 (1952).

[8] Robert A. Freidel, Milton Orchin, "Ultra-Violet Spectra of Aromatic Compounds." John Wiley & Sons, Inc., New York (1951).

concentrations at which they had been determined. Beer's law states that the proportion of light absorbed is directly proportional to the number of molecules through which the light passes; that is, to the length of the light path and the concentration of the solution. In this case the length of the light path was unity throughout. As the concentration *versus* absorbency graphs for all oils and oil fractions used in this study were straight lines passing through the origin, it was assumed that no solution effects were causing deviations with concentration. Therefore the absorbency indices of the oils, even when determined at different concentrations, can be compared on the same basis.

From the determined absorbencies the absorbency indices were then calculated:

$$K = \frac{A}{c}$$

where:

K = absorbency index (specific extinction coefficient)
A = absorbency (optical density)
c = concentration, gm/liter

The absorbency indices were then plotted against wavelength.

Eby Fractionations

The ten oils, as well as the three Rostler fractions, were then separated by the Eby Chromatographic Method into non-aromatic, aromatic, and polar fractions, and similar absorption spectra and Beer's law curves were determined on these fractions.

The Eby method of separation consists in passing five grams of the oil sample, dissolved in 200 milliliters of n-heptane, through a column containing silica gel. The column is eluted with n-heptane to remove the non-aromatic fraction, with benzene to remove the aromatic fraction, and with pyridine to remove the polar fraction. The fractions are recovered by evaporating the solvent on a steam bath with a stream of nitrogen blowing on to the surface of the liquid.

The same solvents as used for the unfractionated samples were used for the aromatic and non-aromatic fractions; however, as the polar fractions proved to be only partially soluble in n-heptane, with these fractions the original solutions were prepared with 85/15 methyl cyclohexane/ethanol, and all dilutions were made with 95% ethanol. The final solvent mixture was 94.2% ethanol, 4.95% water, and 0.85% methyl cyclohexane and was used for the entire spectrum.

The concentrations for the aromatic fractions were 0.006 to 0.008-gm/liter from 215 to 250 mμ, and 0.016-gm/liter from 240 to 320 mμ; for the polar fractions the concentrations varied from 0.008 to 0.025 over the entire spectrum. Because of the extremely low absorbencies of the non-aromatic fractions, the concentrations were made as high as possible; 16 gm/liter was the maximum.

Results and Discussion

Ultra-violet absorption data and composition of the ten processing oils, as determined by the Eby Chromatographic Method, are shown in Table 1, and the absorption spectra for these oils in Figures 1 and 2. It is evident from the spectra that there is considerable difference between them, either in structure or quantity of the absorbing components.

The Ten Oils and Eby Fractions

From the absorption curves of the non-aromatic fractions, shown in Figures 3 and 4, it can be seen that, except in the case of Gulf NE-C at the lower wavelengths, the non-aromatics contribute very little to the total absorbency, and that their effect on the absorbency is chiefly as a diluent.

The absorbency index *versus* wavelength curves for the aromatic fractions of the processing oils are shown in Figures 5 and 6. These curves are of the same general shape as those of the unfractionated oils, although of somewhat greater magnitude and with more sharply defined maxima and minima.

The spectra of the polar fractions shown in Figures 7 and 8 retain only a suggestion of the absorption maxima near 230 and 260 mμ. The magnitude, however, of the absorbency is only somewhat less than that of the aromatic fractions, so that in the more highly aromatic oils, their contribution to the total absorbency is not negligible.

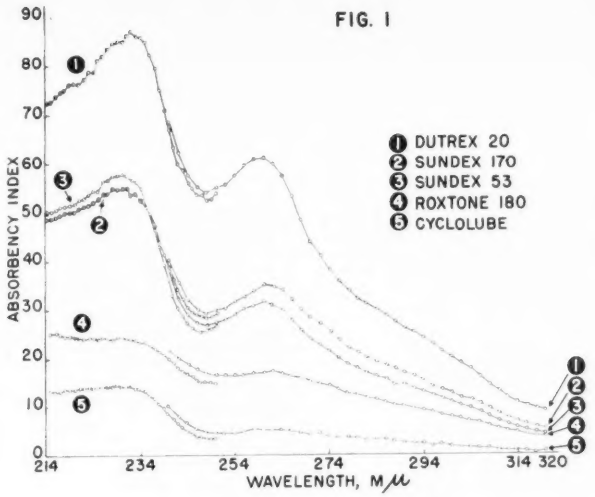
Golden Bear Oils

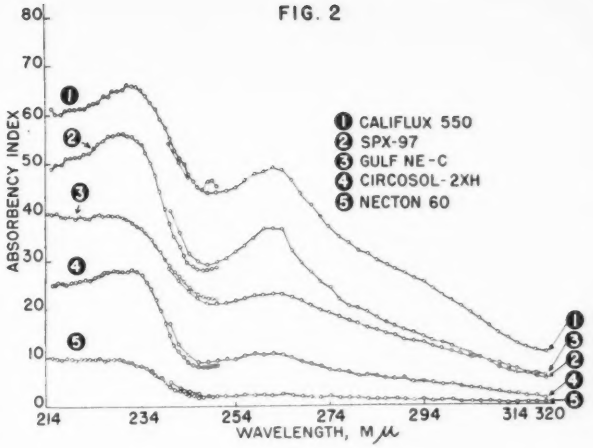
In Table 2 ultra-violet absorption data and composition according to the Eby Chromatographic Method for the three Golden Bear Oil Co.'s samples are shown, and absorption spectra are shown in Figure 9. The spectra of both of the acidaffin samples show the same peaks as well as the same general shape as those of the ten unfractionated oils previously discussed; in the nitrogen bases both peaks are considerably less well defined. The non-aromatics by the Eby method, shown in Figure 10, of both the acidaffin samples also do not exhibit any considerable absorbency; the non-aromatic fractions of the nitrogen bases showed a higher absorbency, but the contribution to total absorbency is negligible.

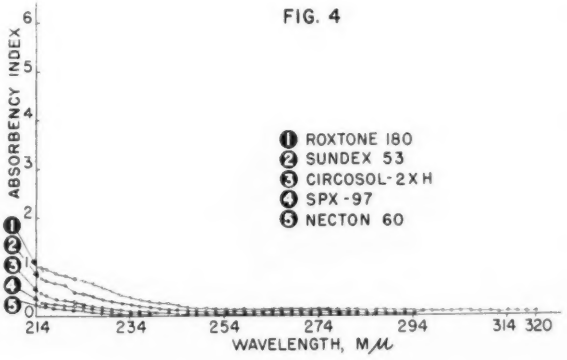
The aromatics from the Golden Bear Oil Co.'s special samples, Figure 11, especially the acidaffins, have well defined maxima at both 230 and 260 mμ.

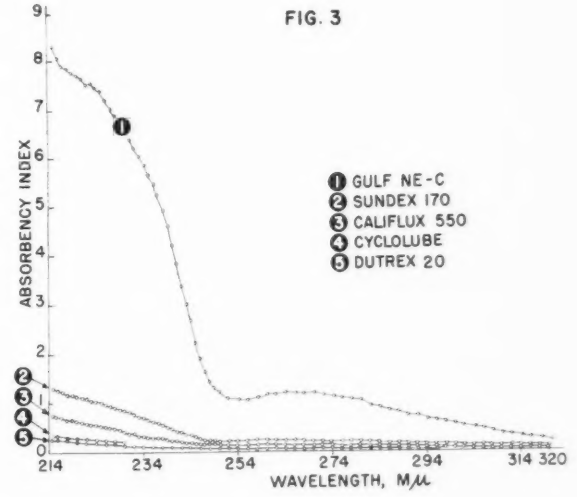
The absorption spectra of the polar fractions differ from one another considerably, as can be seen in Figure 12. The 260 mμ maximum is fairly clear for the polar fraction from the second acidaffins; while both maxima are almost completely lost in that from the first and second acidaffin mixture. The polar fraction from the nitrogen bases has a maximum at 237 mμ and a minimum at 227 mμ, but only a suggestion of a maximum at 260 mμ similar to that obtained with the aromatic fractions or whole oils.

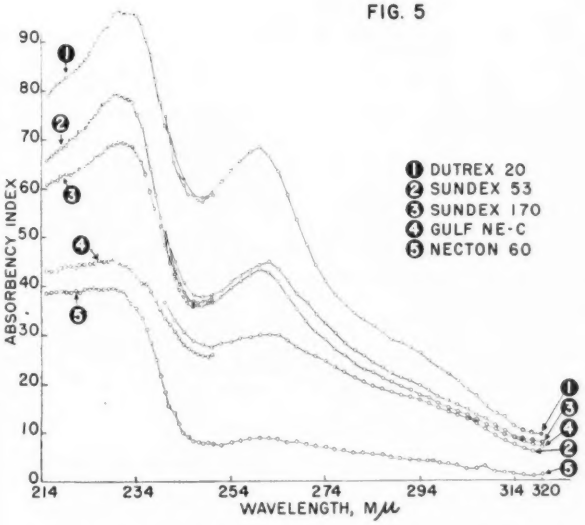
The spectra of the ten processing oils as well as of the three Golden Bear samples indicate the presence of substances which have unsaturated ring nuclei, as do the spectra of the aromatic fractions. The non-aromatics appear to be merely diluents, with regard to ultraviolet absorption. The polar fraction from the nitrogen bases, as indicated by the peak at 237 mμ, appears to contain

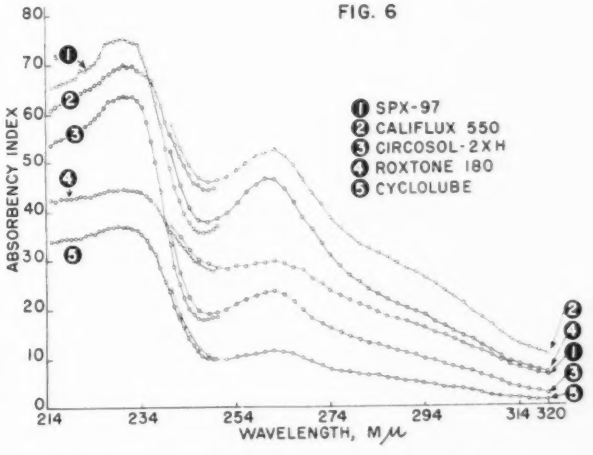












Figs. 1-2. Ultra-violet absorption spectra of processing oils of varying aromatic content used in masterbatching rubber polymers

Figs. 3-4. Spectra of non-aromatic fractions of the processing oils

Figs. 5-6. Spectra of aromatic fractions of the processing oils

TABLE 1. ULTRA-VIOLET ABSORPTION DATA FOR PROCESSING OILS

Oil	Eby Fractions[1] Aromatic %	Aromatic K	Aromatic %xK/100	Polar %	Polar K	Polar %xK/100	Non-Aromatic %	Non-Aromatic K	Non-Aromatic %xK/100	Whole Oil Calculated from Fractions K	Whole Oil Determined K	Wave Length mμ
Absorbency Index, (K) Maximum Near 230 mμ*												
Dutrex 20†	83.7	96.0	80.4	11.2	58.1	6.5	5.1	0.11	0	86.9	87.0	232
Califlux 550‡	77.2	69.5	53.7	11.7	51.2	6.0	11.1	0.37	0	59.7	66.0	231
Gulf NE-C§	69.3	45.0	31.2	10.2	36.7	3.7	20.5	7.01	1.4	36.3	39.4	227
Sundex 170**	72.3	69.0	49.9	6.9	42.1	2.9	20.8	0.85	0.2	53.0	54.8	229
SPX-97†	68.9	75.1	51.7	6.3	48.1	3.0	24.8	0.11	0	54.7	56.0	229
Sundex 53**	67.5	78.9	53.3	7.2	42.1	3.0	25.3	0.29	0.1	56.4	57.5	230
Roxtone 180††	47.8	44.5	21.3	4.2	33.5	1.4	48.0	0.51	0.2	22.9	24.4	230
Circosol-2XH**	40.7	63.2	25.7	4.7	8.5	0.4	54.8	0.14	0.1	26.2	27.9	229
Cyclolube‡	37.5	37.2	14.0	1.7	5.7	0.1	60.8	0.16	0.1	14.2	14.5	229
Necton 66*††	21.1	394.	8.3	0.0	....	0	78.9	0.08	0.1	8.4	9.5	227
Absorbency Index, (K) Minimum Near 247 mμ*												
Dutrex 20	83.7	57.7	48.3	11.2	45.7	5.1	5.1	0.05	0	53.4	53.3	248
Califlux 550	77.2	44.3	34.3	11.7	42.2	4.9	11.1	0.14	0	39.2	44.3	247
Gulf NE-C	69.3	26.8	18.6	10.2	24.9	2.5	20.5	1.41	0.3	21.4	21.6	248
Sundex 170	72.3	36.5	26.4	6.9	28.7	2.0	20.8	0.22	0	28.4	28.8	247
SPX-97	68.9	25.9	24.7	6.3	36.8	2.3	24.8	0.03	0	27.0	28.0	247
Sundex 53	67.5	35.9	24.2	7.2	27.2	2.0	25.3	0.07	0	26.2	25.6	247
Roxtone 180	47.8	28.4	13.6	4.2	24.3	1.0	48.0	0.11	0.1	14.7	15.1	249
Circosol-2XH	40.7	18.0	7.3	4.7	4.4	0.2	54.8	0.03	0	7.5	8.0	247
Cyclolube	37.5	10.2	3.8	1.7	2.1	0	60.8	0.04	0	3.8	3.4	249
Necton 60	21.1	7.8	1.6	0.0	....	0	78.9	0.02	0	1.6	1.9	249
Absorbency Index, (K) Maximum Near 260 mμ*												
Dutrex 20	83.7	67.7	56.7	11.2	40.7	4.6	5.1	0.04	0	61.3	61.0	258
Califlux 550	77.2	52.5	40.5	11.7	29.6	3.5	11.1	0.10	0	44.0	48.7	262
Gulf NE-C	69.3	30.0	20.8	10.2	24.2	2.5	20.5	1.14	0.2	23.5	23.2	262
Sundex 170	72.3	44.2	32.0	6.9	27.6	1.9	20.8	0.20	0	33.9	35.3	260
SPX-97	68.9	46.5	32.0	6.3	34.4	2.2	24.8	0.02	0	34.2	35.5	260
Sundex 53	67.5	43.3	29.2	7.2	26.1	1.9	25.3	0.05	0	31.1	31.8	260
Roxtone 180	47.8	30.0	14.3	4.2	23.2	1.0	48.0	0.09	0	15.3	17.2	262
Circosol-2XH	40.7	23.7	9.6	4.7	4.2	0.2	54.8	0.02	0	9.8	10.7	262
Cyclolube	37.5	11.7	4.4	1.7	2.1	0	60.8	0.03	0	4.4	5.4	262
Necton 60	21.1	8.8	1.9	0.0	....	0	78.9	0.02	0	1.9	2.3	258

* Maximum and minimum points were chosen from the whole oil spectra.
† Shell Oil Co., New York, N. Y.
‡ Golden Bear Oil Co., Oildale, Calif.
§ Gulf Oil Co., Pittsburgh, Pa.
** Sun Oil Co., Philadelphia, Pa.
†† Esso Standard Oil Co., New York, N. Y.

TABLE 2. ULTRA-VIOLET ABSORPTION DATA FOR ROSTLER FRACTIONS[2]

Oil	Eby Fractions Aromatic %	Aromatic K	Aromatic %xK/100	Polar %	Polar K	Polar %xK/100	Non-Aromatic %	Non-Aromatic K	Non-Aromatic %xK/100	Whole Oil Calculated from Fractions K	Whole Oil Determined K	Wave Length mμ
Absorbency Index, (K) Maximum Near 230 mμ*												
Nitrogen bases	33.3	79.7	26.5	66.3	66.4	44.0	0.4	7.12	0	70.5	72.2	231
1st & 2nd acidaffins	87.3	94.5	82.5	7.1	50.6	3.6	5.6	0.19	0	86.1	86.8	232
2nd acidaffins	85.0	90.0	76.5	2.7	49.9	1.3	12.3	0.10	0	77.8	80.6	231
Absorbency Index, (K) Minimum Near 247 mμ*												
Nitrogen bases	33.3	55.8	18.6	66.3	39.9	26.5	0.4	3.18	0	45.1	42.2	254
1st & 2nd acidaffins	87.3	56.2	49.1	7.1	39.7	2.8	5.6	0.09	0	51.9	52.5	247
2nd acidaffins	85.0	35.2	29.9	2.7	26.6	0.7	12.2	0.05	0	30.6	30.9	247
Absorbency Index, (K) Maximum Near 260 mμ*												
Nitrogen bases	23.3	58.6	19.5	66.3	39.4	26.1	0.4	3.10	0	45.6	42.9	258
1st & 2nd acidaffins	87.3	67.5	58.9	7.1	36.7	2.6	5.6	0.07	0	61.5	62.6	260
2nd acidaffins	85.0	42.9	36.5	2.7	29.2	0.7	12.3	0.04	0	37.2	38.7	260

* Maximum and minimum points were chosen from the whole oil spectra.

FIG. 7

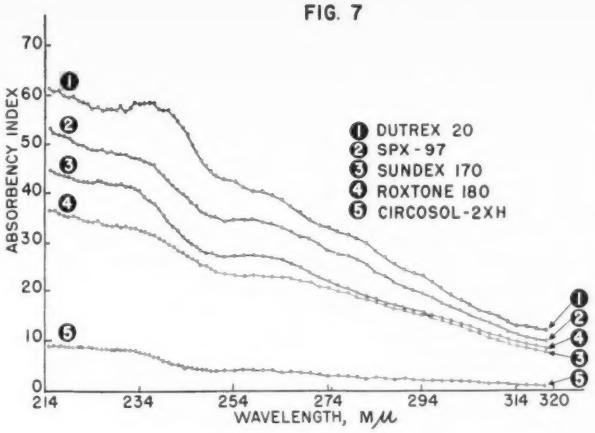


FIG. 8

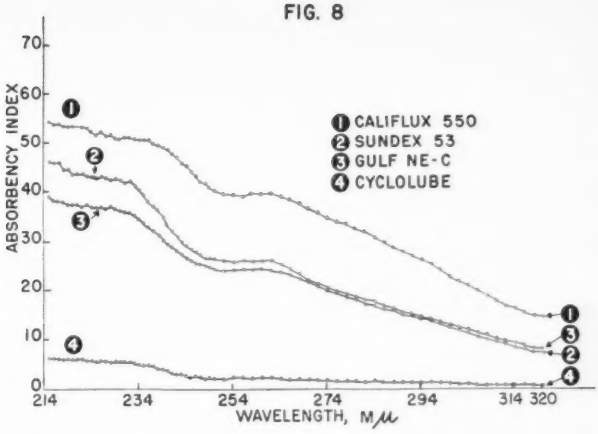


FIG. 10

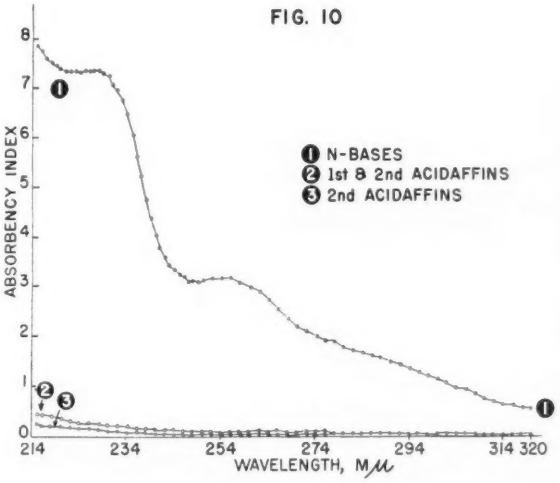


FIG. 9

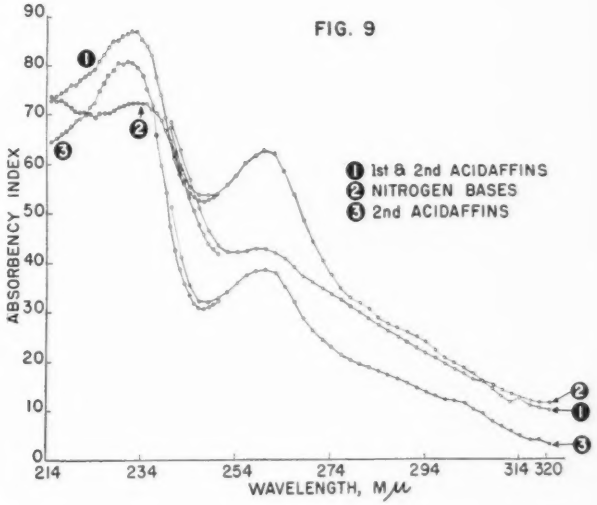


FIG. 11

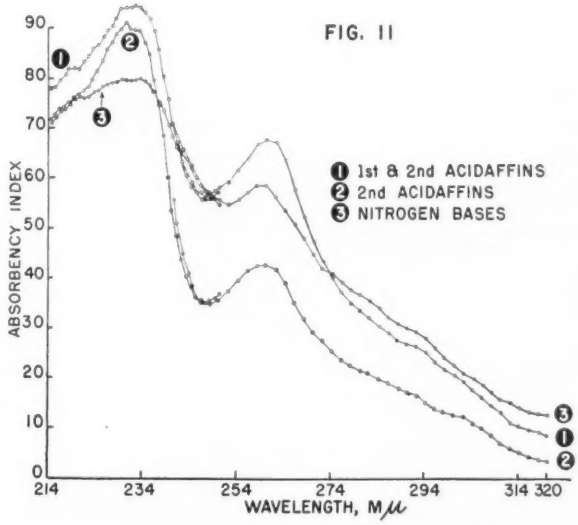
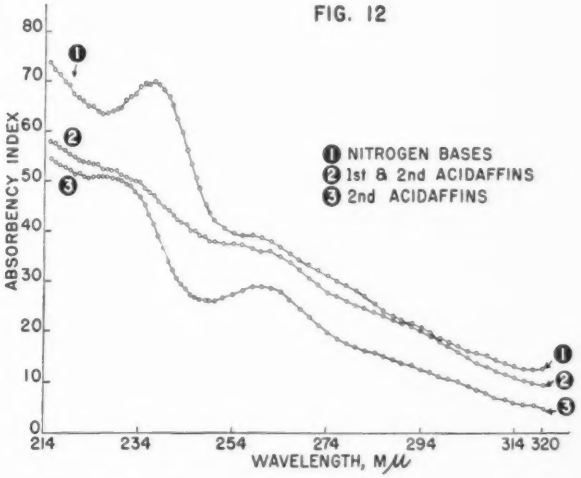


FIG. 12



Figs. 7-8. Spectra of polar fractions of the processing oils

Fig. 9. Ultra-violet absorption spectra of Golden Bear Oil Co. processing oil fractionated by the Rostler Method

Fig. 10. Spectra of Golden Bear Rostler fractions further fractionated into non-aromatic parts

Fig. 11. Spectra of Golden Bear Rostler fractions also further fractionated into aromatic parts

Fig. 12. Spectra of Golden Bear Rostler fractions further fractionated into polar parts

some compounds or mixture of compounds not apparent elsewhere. The oils studied here, and their fractions, differ from each other, either in structure of components or in proportion of components present, or both.

These results are in general agreement as to interpretation with the work of Linning and Stewart[9] reported earlier.

Conclusions

Ultra-violet absorption spectra for ten processing oils used in masterbatching rubber polymers show considerable differences which may be attributed to variations in structure or composition of the oils, or both.

When each oil was fractionated by the Eby Chromatographic Method and similar ultra-violet absorption spectra were obtained, it became evident that the non-aromatic fractions of the oils contributed little or nothing to total absorbency.

Spectra for the aromatic portions of the processing oils, however, were similar to the spectra for the whole oils and, in addition, showed more sharply defined maxima and minima.

Polar fractions of the oils produced spectra only somewhat less in magnitude than those for the aromatic fractions, and although absorption maxima were poorly defined, these fractions contribute significantly to total absorbency.

Ultra-violet absorption spectra of the ten processing oils as well as of the three oil samples identified as concentrated nitrogen bases, second acidaffins, and a mixture of first and second acidaffins from Golden Bear Oil Co., and for non-aromatic, aromatic, and polar fractions of these three oils indicate that the whole oils and the aromatic fractions contain substances having unsaturated ring nuclei.

The non-aromatic fractions of the Golden Bear oils appear to be diluents as far as ultra-violet absorption is concerned. It will be recalled that the non-aromatic fractions of the ten processing oils previously examined appeared to act as diluents also.

The polar fractions of the Golden Bear oils differ from each other and from the polar fractions of the ten processing oils examined in that the second acidaffin and the nitrogen bases samples have maxima. The first and second acidaffin sample shows little evidence of maxima.

[9] Paper given at Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Feb. 28-Mar. 4, 1955.

Kel-F Aid to Neurosurgeon

Kel-F trifluorochloroethylene polymer, a product of M. W. Kellogg Co., New York, N. Y., is being used to coat surgical instruments to make them safe where electrical current is required, according to John H. Drew, chief of neurosurgical service at the Veterans Administration Hospital, Boston, Mass., writing in the September issue of the *Journal of Neurosurgery*.

Dr. Drew, in his article, "An Insulating Plastic Coat for Neurosurgical Instruments," stated that it is standard practice to use electrical current in the neurosurgical operating room for prevention of bleeding, coagulation of bleeding points, and coagulation of isolated nerve roots and residual tumor tissue.

Searching for a good insulating material, he said he found Kel-F the most effective of those tested. Its applicable properties included high dielectric strength and arc resistance, resistance to average wear in the operating room, ability to withstand repeated sterilizing for long or short periods, moderate flexibility, and ease of application to the instruments, the hospital administrator reported.

RMA Panel

(*Continued from page 382*)

the opportunity to be taken on such a dizzy, speculative, and risk-ridden *price* ride as we have had in 1955.

Summary and Conclusions

To summarize then—

We have had an unexpected and extremely high level of demand for new rubber worldwide in 1955.

The world supply position has been in delicate balance with world demand, with the result that speculative opportunities have been present in crude natural rubber and have been acted upon by world speculators.

The privately owned American man-made rubber industry has not yet had opportunity to expand to meet these large demands, but now has the needed expansions planned or under way.

The growth in world demands for the next five years cannot be met by increasing crude rubber supplies because the necessary high-yielding trees have not been planted.

Such expanding world demands will be met, and, in time, by the man-made rubber industry, which will increase both the quantities and the qualities of rubbers available and will bring in new types as the needs justify.

Each rubber products manufacturer must realize the necessity of keeping up with, or ahead of, the parade in converting to higher percentages of man-made rubbers, or must run the risk of being non-competitive.

Until the new synthetic natural rubbers become commercially available there will be a quality need of some percentage of crude natural rubber. The best immediate opportunity to take the pressure off worldwide rubber prices is through supplying foreign rubber products manufacturers with man-made rubbers and the technical help they so desperately want to replace penalty priced crude—and American rubber products manufacturers can aid greatly in this conversion.

Finally, there will continue to be an important place for efficiently produced crude natural rubber, *but*, if we American manufacturers do our jobs, there should not again be the opportunity for the wide and speculative price swings of the past.

Effect of Temperature on the Air Permeability of Silicone Rubber[1]

By JOHN B. GREGORY

Frederick S. Bacon Laboratories, Watertown, Mass.

The permeability to air of several silicone rubber compounds at 75° F. and at 158° F. compared with that of natural and butyl rubbers has been determined by means of a simplified apparatus which was developed for this purpose.

Silicone rubber compounds have greater permeability to air at 75° F., but show less change in air permeability at the higher temperature than the natural and butyl rubbers.

The presence of certain fillers in silicone rubber compounds reduces their permeability to air, as expected.

THE purpose of this study was to measure the air permeability of silicone rubber and to determine the effect on the permeability of temperature and of filler additions.

In the course of our work for the Air Force, we selected silicone rubber for hermetic seals despite its comparatively high cost and low strength because of two characteristics: its low compression set at extremes of temperature and its resistance to swelling in the hydraulic fluids used. Data on the air permeability of silicone rubber are meager, although the Dow Corning Co. informs us that its permeability is high.[2]

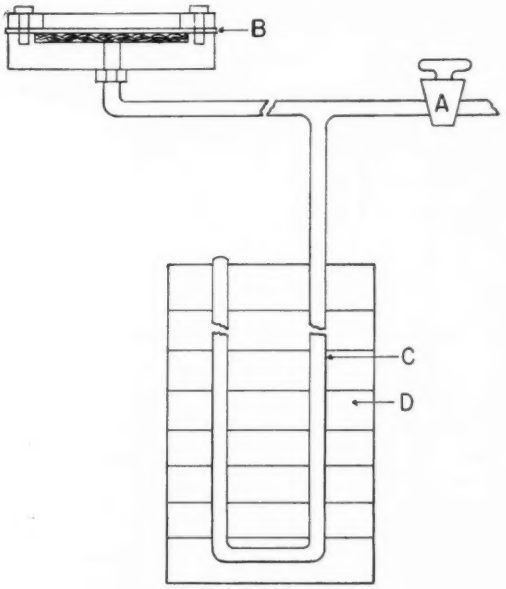


Fig. 1. Simplified apparatus used for air permeability study of silicone rubber

A—Stop cock
B—Rubber sample
C—Manometer
D—Scale

Silicone rubber's unique resistance to compression set at extremes of temperature is doubtless related to its characteristic independence of temperature change. For example, a typical natural rubber formulation may show a hundredfold modulus change in going from +75 to —83° F.; while one type of silicone rubber shows but a 1.8-fold change from 32 to —112° F.[3]

It has been shown by Fox, Warrick, and others[3-5] that the interchain forces between the long chain-like silicone rubber molecules do not decrease with increasing temperature in the usual fashion because of two unique structural features: their coiled-helix architecture and the highly ionic character of their siloxane bonds. The explantion given is that increased temperature tends to lengthen the coils (the helices), making them more difficult to separate. This mechanism accordingly raises the viscosity of the mass, counteracting in part the normal decrease in viscosity with temperature. Opening these coiled structures also brings into play the influence of the polar siloxane links which are thought to be internally compensated in the coil form. These exposed dipoles tend to interact increasing the attractive forces between the molecules, again counteracting the normal decrease in attractive forces with temperature.

Van Amerongen's series of papers on the permeability of elastomers to gases[6-8] demonstrate that the rate of permeation is a function of a given gas and given rubber. The process is controlled chiefly by two factors: solubility of the gas in the elastomer and the rate of diffusion through the rubber. The solubility of the gas in the rubber is determined by its tendency to condense

[1] Presented before the Division of Rubber Chemistry, ACS, Detroit, Mich., May 4, 1955.
[2] Dow Corning Corp., private communication dated July 20, 1951, signed by J. T. Duane, technical representative.
[3] E. C. Warrick, M. M. Hunter, A. J. Barry, *Ind. Eng. Chem.*, 44, 2196 (1952).
[4] A. M. Barry, *J. Applied Phys.*, 17, 1020 (1946).
[5] H. W. Fox, P. W. Taylor, W. A. Zisman, *Ind. Eng. Chem.*, 39, 1401 (1947).
[6] *Rubber Chem. Tech.*, 20, 479 (1947).
[7] *Ibid.*, 20, 494 (1947).
[8] *Ibid.*, 24, 109 (1951).

and by the interaction between the rubber and gas molecules. The cohesive energy of the molecular chains to which the activation energies for permeation and diffusion are related is temperature-dependent. This energy corresponds to the cohesive energy of the chain element concerned and is related to the viscosity of the fluid or plastic mass.[8]

Because of the unique viscosity-temperature relation of uncured silicone rubber and the unique modulus- or hardness-temperature relation of the cured silicone rubber, Van Amerongen's data would predict that the change in permeability of silicone rubber with changes in temperature should also be unique.

Experimental Procedure

With the exception of the permeability tests and the determination of physical properties at 158° F., standard ASTM procedures[9] were used for mixing and testing the rubbers. In the determination of compression set using ASTM Procedure D395-46T, Method B, the samples were die cut from the standard ASTM test slab, using a ¼-inch diameter punch.

The apparatus used for the air permeability study is shown in Figure 1. The air permeability of the rubber is determined by clamping the rubber in the position shown in Figure 1, the upper side of the rubber being exposed to the room air at atmosphere pressure, evacuating the system fully, and waiting one-half hour for the rubber to degas and for equilibrium conditions to occur. The system is then evacuated again. Stop cock A is closed, and the time and the pressure in the system are recorded. After suitable periods thereafter, the time and pressures are again recorded. Since the area and the thickness of the exposed rubber and the volume of the system are known, the permeability, Q, of the rubber can be calculated.

The volume of our apparatus at 0 inches of mercury pressure has been calculated at 17.6 ml. At pressures other than 0 the volume is $17.6 + \frac{1}{2}P \times 2.54 \times 0.282$, where 0.282 is the cross-sectional area of the manometer capillary in cm.^{2}, and P is the pressure in inches of mercury. The area of rubber exposed is 20.3 cm.^{2} The thickness is taken as the average of four equidistant measurements taken around the circumference of the sample.

$$Q = \frac{\text{Volume STP} \times \text{Thickness} \times 10^{-6}}{\text{Time} \times \text{Avg. Driving Force} \times 8000}$$

where the Volume is given in cubic centimeters, the Thickness in mils, Time in seconds, and Driving Force in atmospheres.

$$\text{Volume STP} = \text{Final Volume STP} - \text{Initial Volume STP} = \text{Volume} \times P \times 0.3 = (17.6 + 0.36) \times P \times 0.3$$

where P is the pressure in inches.

$$\text{Average Driving Force} = \frac{30\frac{1}{2}\ (P_1 + P_2)}{30}$$

where P_1 and P_2 are the initial and the final pressure in inches of mercury.

Permeabilities of temperatures other than room temperature are obtained by placing the entire apparatus into an oven at the desired temperature. The oven should have a glass port through which the manometer can be observed.

Tensile strength and elongation values at 158° F. were obtained by conditioning the standard ASTM dumbbell specimens in an oven at 158° F. ± 2° F. for 15 minutes and then quickly placing them into the jaws of a Scott tester and breaking them in the usual fashion. The area about the jaws and the jaws themselves is kept at approximately 158° F. by infrared radiation from a heat lamp. Hardness tests are taken while the samples are in an oven at 158° F., resting on a one-inch thick aluminum plate. The durometer is not heated prior to testing the samples as it does not read correctly when warm.

Results

TABLE 1. AIR PERMEABILITY OF COMMERCIAL SILICONE RUBBER COMPOUNDS AT 75° F. ±5° F.*

Compound	Shore A Durometer Hardness	Permeability Cm.^{3}/Sec./Cm./Atm. × 10^{-6} Experimental	Permeability Cm.^{3}/Sec./Cm./Atm. × 10^{-6} Values from the Literature†
Silastic‡ 152	55	2.2	2.3**
7171	65	1.4	—
67171	71	1.3	—
7181, 95 parts; Silastic 7171, 5 parts	75	1.6	1.6**
675	78	1.6	—
SE-380 Silicone Rubber Compound§	91	1.3	—
Natural rubber#	40	0.1	0.08††
Butyl rubber#	48	0.02	0.004††

*These rubbers were press cured 10 min. at 260° F. and then oven cured for 16 hours at 480° F., including a ½-hour rise to 480° F.

†The literature values for the silicone rubbers were given for Silastic 250 and Silastic 181, respectively. Silastic 250, like Silastic 152, is a high tensile type of about 45 Shore A durometer hardness. The literature values for the natural and butyl rubbers are estimated from the published data for nitrogen and oxygen and pure gum compounds. Filled compounds would have lower permeabilities.[6]

‡ Dow Corning Corp.
§ General Electric Co.
# Frederick S. Bacon Laboratories.
** Footnote[2].
†† Footnote[8].

Table 1 gives the results of permeability measurements for a variety of silicone rubbers and comparative values for natural and butyl rubbers. The values obtained in most instances check literature values closely, indicating that the method gives reliable results for rubbers of high permeability. The high value obtained for butyl indicates that there is enough leakage to cause a significant error with rubbers of very low permeability. It should be noted that

(a) the silicone rubbers are much more permeable than natural rubber or butyl rubber at 75° F.;

[9] "ASTM Standards on Rubber Products, Dec. 1954." American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

(b) the higher the Shore A durometer hardness of the silicone rubber, the lower the permeability;
(c) Silastic 675 and Silastic 7181 appear to have higher permeabilities than the other silicone rubbers of similar durometer hardness.

Table 2 gives the formula for the natural and butyl rubbers tested. A short study was made to determine the effect of filler additions on the permeability of silicone rubbers. The results given in Table 3 show that both the amount and the character of filler have an influence. The plate-like fillers, talc and mica, give the largest reductions in permeability.

TABLE 2. FORMULATION OF NATURAL AND BUTYL RUBBER COMPOUNDS USED IN PERMEABILITY STUDY

Material	Supplier	Parts by Weight: Natural Rubber Cpd.	Parts by Weight: Butyl Rubber Cpd.
Pale crepe	H. A. Astlett & Co.	100	—
GR-I 50*	Federal Facilities Corp.	—	100
Reogen	R. T. Vanderbilt Co.	1	—
Stearic acid	Witco Chemical Co.	1	1
Paraflux	C. P. Hall Co.	10	—
Neozone D	E. I. du Pont de Nemours & Co., Inc.	1	—
Thermoflex A	Du Pont	1	—
Zinc Oxide Red Label 4X	New Jersey Zinc Co.	5	5
SAF Black—Philblack E	Phillips Chemical Co.	25	—
Blackbird			
Sulfur	Hall	3	—
Heliozone	Du Pont	1	—
Altax	Vanderbilt	1.5	—
Thiruam M	Du Pont	0.1	—
SRF Black—Sterling S	Godfrey L. Cabot, Inc.	—	28
Red Lead Pb_3O_4	National Lead Co.	—	10
Dibenzo GMF	Naugatuck Chemical, Division of United States Rubber Co.	—	6
Min. cure at			
320° F.		15	—
310° F.		—	15

* Now Enjay Butyl 150; supplier, Enjay Co., Inc.

Measurements of permeability of various rubbers made at 158° F. are compared in Table 4 with the values obtained at room temperature. These data show that the air permeability of silicone rubbers is not so much affected by temperature as it is with other rubbers. The air permeability of the silicone rubber at 158° F. appears to be virtually the same as that of natural and butyl rubber despite the large differences at 75° F.

Table 5 gives the comparative physical properties of

TABLE 4. EFFECT OF TEMPERATURE ON AIR PERMEABILITY OF VARIOUS RUBBERS*

Compound	Permeability at 75° F. (Cm.³/Sec./Cm./Atm. ×10⁻⁶): Experimental	Permeability at 75° F.: Values from the Literature	Permeability at 158° F. (Cm.³/Sec./Cm./Atm. ×10⁻⁶): Experimental	Permeability at 158° F.: Values from the Literature
Silastic 152	2.2	—	2.8	—
7171	1.4	—	2.9	—
SE-380 Silicone Rubber Compound	1.3	—	2.8	—
Stock No. 1†	0.8	—	1.0	—
Natural Rubber‡	0.1	0.08	2.9	0.5§
Butyl Rubber‡	0.02	0.004	1.6	0.04§

* See Tables 1, 2, and 3 for curing times.
† See Table 3.
‡ See Table 2.
§ See Note †, Table 1; also Footnote 8.

TABLE 5. EFFECT OF TEMPERATURE ON THE PHYSICAL PROPERTIES OF VARIOUS RUBBERS*

Compound	Physical Properties at 75° F.: Tensile	Elongation	Shore A Hardness	Physical Properties at 158° F.: Tensile	Elongation	Shore A Hardness
Silastic 152	715	345	55	652	283	55
7171	616	110	65	607	113	64
SE-380 Silicone Rubber Compound	621	73	91	698	87	87
Natural Rubber†	2200	685	44	2000	700	41
Butyl Rubber†	1085	600	48	590	540	41

* See Tables 1, 2, and 3 for curing times.
† See Table 2.

TABLE 3. EFFECT OF COMPOUNDING ON PERMEABILITY OF SILICONE RUBBER TO AIR AT 75° F.

Ingredients	Source	Stock No.	1	2	3	4	5	6
			Parts by Weight					
SE-51 Gum	General Electric Co.		100	100	100	100	100	100
Celite 270	Johns-Manville Corp.		150	100	100	—	—	—
Trinity Super Fine Talc	Innis, Speiden & Co.		—	50	—	—	—	50
Triple A Mica	Thompson, Weinman Co.		—	—	50	—	65	—
Red Oxide RY-4596	C. K. Williams Co.		1	1	1	—	—	—
Hi-Sil 303	Pittsburgh Plate Glass Co.		—	—	—	42	42	42
Mercurous Oxide	Mallinckrodt Chemical Works		1.7	1.7	1.7	1.6	2.25	2.25
Luperco AGE	Lucidol Division of Wallace & Tiernan, Inc.		3	3	3	3.2	4.5	4.5
Physical Properties after Press Cure of 10 Min. at 260° F. Plus Oven Cure of 24 Hours at 480° F.								
Tensile strength, psi.			560	345	425	445	550	480
Elongation at break, %			82	75	98	210	63	95
Hardness			88	83	73	52	79	73
Compression set 22 hrs. at 300° F.			—	—	—	24	24	31
Air permeability, cc./sec./cm./atm. × 10^{-6}			0.8	0.6	0.7	1.8	0.8	0.8

these same rubbers at 75 and 158° F. The smaller temperature-dependence of the physical properties of the silicone rubbers, as compared to natural and butyl rubbers, is quite evident.

Discussion

The relation of permeability coefficient, Q, diffusion coefficient, D, and solubility coefficient, S, for a given gas in a given rubber follows:

$$Q = DS$$

It can be seen, therefore, that the relatively high air permeability of silicone rubber at room temperature can result from either a high diffusion coefficient or a high solubility or both. It has been shown by Van Amerongen[7] that for a wide variety of rubbers other than silicone the differences in permeability of a given gas are chiefly governed by differences in rate of diffusion and only to a very minor degree by differences in solubility. Silicone rubber, because of the internal compensation of its siloxane bonds in the coiled helix, is non-polar and hence should be a relatively good solvent for non-polar gases such as N_2 and O_2. At higher temperatures, because of exposure of the siloxane bonds and resultant increase in molecular polarity, the solubility of these gases may decrease more than might normally be expected. It would be of interest to have data on the effect of temperature on the solubility of air in silicone rubber to verify this fact.

While the high solubility of the air in the silicone rubber is doubtless a factor, Van Amerongen's data[7] indicate that its high air permeability results chiefly from the high rate of diffusion of the air through the rubber. This indicates that silicone rubber has a low energy of activation for diffusion and low intermolecular cohesion. The low tensile strength of silicone rubber shown in Table 5 also indicates low intermolecular cohesion. Rochow has shown that the molecular weight of silicone rubber is actually comparable to that of other rubbers and that its low tensile strength cannot be explained by low molecular weight.[10]

At elevated temperatures the air-permeability of the silicone rubbers is more like that of the other rubbers. This condition would indicate that at these temperatures the activation energy of silicone rubber for diffusion and intermolecular cohesive forces approach that of the other rubbers. The data in Table 5 show this point, particularly in the case of the butyl rubber. The strength of the natural rubber is higher than its permeability would indicate, probably because its strong tendency to crystallize at high elongation is a complicating factor in this connection.

The effect of compounding on the silicone rubber is about as would be expected from data published by Van Amerongen.[6] Additions of filler, as indicated in Table 3, reduce the permeability, and particle size and shape are influential. Forty-two parts of Hi-Sil, for example, are nearly as effective as 100 parts of the coarser Celite 270. On the other hand, the relatively coarse Triple A mica and Trinity Super Fine talc are more effective than Celite 270, probably because of their platey character.

Not enough data were available to enable us to determine whether or not the fillers reduce permeability merely by dilution of the elastomer and increasing the length of the path to be followed by the gas, or whether the fillers by stiffening the rubber increase its cohesive energy and the activation energy for diffusion. Further study of filler additions might shed light on this point and thereby give us a better insight into the mechanism of reinforcement of rubbers by fillers.

Summary

Using a simplified apparatus for determining the permeability of rubbers to air, a study has been made of the air permeability of various silicone rubber compounds at 75 and 158° F. In contrast to the carbon skeletal rubbers also tested, the silicone rubbers show little change in air permeability at the two temperatures. This difference is in accord with the current theories of permeation and molecular structure postulated by other investigators who have studied this polymer. The presence of filler in silicone rubber compounds reduces their air permeability as expected.

[10] *Science*, 111, 271 (1950).

Specifications of Esso Co^{60} Radiation Cave

Specifications of the concrete-and-glass radiation cave which comprises the main section of Esso Research & Engineering Co.'s new radiation laboratory at Linden, N. J., have been released by H. K. Ferguson & Co., builder of the installation.

Radiation source of the cave is a 13-inch cobalt pipe, with a two-inch outer diameter, that was subjected to neutron bombardment for two years at the Brookhaven National Laboratories, Upton, L. I., forming the gamma ray-emitting Co^{60}. The pipe is the most radioactive piece of material in use by industry.

The cave is seven feet, eight inches wide; ten feet, seven inches long; and nine feet, eight inches high. More than 200 cubic yards of concrete were used in its foundations and superstructure. The walls are four feet thick and made of 2,500 psi. concrete. The operating face, three feet, five inches thick, consists of dense concrete made of magnetite aggregate.

The glass window has a thickness of three feet. It consists of one plate of 2.7 density non-browning glass, five slabs of 3.2 density non-browning lead glass, one slab of 6.2 density lead glass, and one plate of plate glass. Interstices between the glass slabs are filled with mineral oil.

The installation also includes a Master-Slave Model 8 as manipulators, a 200-pound capacity mechanical rectilinear crane for movement of the source and storage well covers, and three three-inch stainless steel pipes, 5½ feet in length and embedded in concrete, to serve as storage wells. The covers are lead-filled and of stainless steel.

EDITORIAL

Improving the Technical Manpower Situation—A Must!

TECHNICAL manpower in this country—the supply, demand, quality, and the question whether or not our training methods at the university and other levels should be modified to meet the changing conditions of our national and industrial life—has become of more than usual importance of late. During the past five years a great many commissions, professional societies, business men, and educators have concerned themselves with this problem.

First, there is the problem of supply and demand of technical manpower in the United States, and a shortage does exist. As Dr. A. W. Davison, vice chairman of the Engineering Manpower Commission of the Engineers Joint Council, pointed out at a meeting of the Division of Rubber Chemistry of the American Chemical Society in Philadelphia, Pa., on November 2, there are three aspects of this shortage which we cannot afford to ignore. The future of our form of civilization is closely linked with abundant technological advancement; maximum personal welfare and greatest opportunities for advancement for our young people lie in careers in science and engineering; and America's position as a world leader is dependent to a very great extent upon our superior strength through technology.

Second, the manufacturing industries in our country require more and more competent engineers and scientists now, in order to achieve their maximum growth potentials. Since the number of science and engineering graduates has been declining, and it takes from five to ten years for these graduates to become really productive, such industries as rubber and plastics have been searching for improved means of augmenting the education of their technical men, both on and off the job.

Finally, young scientists and engineers and some universities are interested in learning from industry what changes, if any, should be made in engineering and scientific education in order that upon graduation these technical men may be of greatest service to industry and make more rapid progress in it. Older technical men are concerned about additional training to keep them abreast of advances in present-day science and technology.

Dr. Davison indicated a short-term and a long-term aspect to the technical manpower situation, both of which require encouragement by industry for more students in college to choose engineering and science as a career and for more students in our secondary schools to make a similar choice at that level. He emphasized the urgent need of more and better science teachers, which necessitates higher salaries and improved professional and social standing.

Prof. C. C. Winding, of Cornell University, in a paper before the Rubber Plastics Division of the American Society of Mechanical Engineers, in Chicago, on November 16, explained that recent trends in engineering education place more emphasis on fundamentals of physical sciences rather than on specialization. These trends reduce the possibility of specialized courses, such as in rubber and plastics, at the undergraduate level and suggest the need of more such courses at the graduate level.

Both the younger as well as the older technical men in the rubber and plastics industries who cannot avail themselves of full-time graduate training must obtain this training in evening schools or courses arranged by such organizations as our local rubber and plastics groups. The need of courses and textbooks of the highest quality in this connection becomes increasingly apparent.

R. G. Seaman

EDITOR

Meetings and Reports

Outstanding Philadelphia Rubber Division Meeting Attracts Record 1,303 Attendance

It is difficult to attribute to any one factor the reason for the record registration of 1,303 members and guests at the meeting of the Division of Rubber Chemistry of the American Chemical Society held at the Bellevue-Stratford Hotel in Philadelphia, Pa., November 2-4. Of course it was a historic occasion in that papers presented by The B. F. Goodrich Co. and the Firestone Tire & Rubber Co. revealed details of the first successful synthesis of *cis*-polyisoprene polymers having the same molecular composition, structure, and properties of natural *Hevea* rubber. This achievement has been the aim of rubber chemists for more than half a century. It was particularly fitting that these papers were presented at Philadelphia where, in 1919, the Division held its first meeting.

Then there was the Goodyear Medal Award for 1955 to Ray P. Dinsmore, vice president for research and development, Goodyear Tire & Rubber Co., and past chairman of the Division. Dr. Dinsmore, one of the best known and liked members of the Division and, in fact, of the industry, made his Goodyear Medal Award address especially provocative under the title of "Specifications for a Rubber Chemist."

Of special significance also was the invited paper on "The Technical Manpower Situation," given by A. W. Davison, vice chairman, Engineering Manpower Commission, Engineers Joint Council, and Dr. Davison impressed his listeners with the very great importance of improving the technical manpower situation in this country by individual efforts of chemists and engineers working at local community levels.

Finally, the quality and the diversification among the many other papers and the planning and execution of the entire program at the Philadelphia meeting under the able direction of Division Chairman John M. Ball, Midwest Rubber Reclaiming Co., Vice Chairman A. E. Juve, B. F. Goodrich, and other officers were more than adequate reward for those attending.

No plant trips were planned for the Philadelphia meeting, but an interesting program for the ladies was arranged by the local committee, and a good attendance of ladies of the members and guests enjoyed this program and cocktail party and banquet program on Thursday evening.

25-Year Club Luncheon Meeting

The first event on the program of the Philadelphia meeting, that is, the luncheon meeting of the Division's 25-Year Club on Wednesday noon, was characteristic of the entire meeting in that here also a record attendance of more than 200 was recorded. A. H. Nellen, Lee Rubber & Tire Corp., chairman for this affair, first welcomed the members and then asked them to stand for a moment of silence in respect to two members who had passed on since the last meeting, George S. Haslam, N. J. Zinc Co., and Gustav Egloff, Universal Oil Products Co.

Donald Parkinson, formerly of the Dunlop Rubber Co.'s research center, Birmingham, England, and now with the United Carbon Co., was introduced.

It was announced that new members of the 25-Year Club could obtain lapel pins by addressing Owen Brown, Godfrey L. Cabot, Inc., Boston, Mass.

Mr. Nellen then asked H. A. Winkelmann, Dryden Rubber Division, Sheller Mfg. Corp., to conduct the elimination contest whereby the member with the longest record of service in the rubber industry present at the meeting be determined. This honor went to H. B. Underwood, Minnesota Mining & Mfg. Co., who entered the industry in 1908. Mr. Underwood worked for the Goodrich Company from 1908 to 1913, for Ajax Rubber Co., from 1913 to 1930; acted as a consultant until 1940; worked for the Ford Motor Co. from 1940 to 1948; and has been with 3M since 1948.

F. W. Stavely, Firestone Tire & Rubber Co., will be the chairman for the 25-Year Club meeting to be held at the time of

Rubber Division officers for 1956; top, left to right, chairman, A. E. Juve; vice chairman, B. S. Garvey, Jr.; bottom, treasurer, George E. Popp; and secretary, A. M. Neal

the next Rubber Division meeting in Cleveland, O., in May, 1956.

The Business Meeting

At the business meeting of the Division on the morning of November 3, Chairman John Ball first asked the members to stand for a moment of silence in tribute to the passing since the last meeting of the following members: Carl K. Brobeil, Farrel-Birmingham Co.; Gustav Egloff; George S. Haslam; N. C. Hill, C. P. Hall Co.; C. H. Masland, C. H. Masland & Sons.

Mr. Ball announced that the next meeting of the Division was scheduled for Cleveland, May 16-18, 1956, with the Hotel Cleveland as the headquarters hotel. C. A. Smith, N. J. Zinc, will be chairman of the local committee on arrangements for this meeting. Atlantic City, N. J., will be the place of the September 19-21, 1956, meeting at Chalfonte-Haddon Hall Hotel. A joint meeting of the Division with the Rubber Division, Chemical Institute of Canada, will be held in Montreal, P.Q., May 15-17, 1957, at the Sheraton-Mt. Royal Hotel. New York's Commodore Hotel will be the location of the meeting which is scheduled for September 11-13, 1957.

The "Best Paper Award" of the Division for the May, 1955, meeting was made by the chairman of the committee, G. C. Maassen, R. T. Vanderbilt Co., to J. S. Rugg and G. W. Scott, E. I. du Pont de Nemours & Co., Inc., for their paper, "Adiprene B Urethane Rubber—II, Factors Influencing Its Processability." It was mentioned that because of strong competition for this award the numerical rating system used proved invaluable since otherwise it would have been almost impossible to select the best paper. Mr. Maassen congratulated Mr. Rugg and Dr. Scott and expressed the hope that the papers given before the Division continue the high standards set by their paper.

Waldo Semon, B. F. Goodrich, chairman of the by-laws revision committee, presented certain revisions for approval. The first concerned the addition of a director to represent the membership of the Division resident in Canada, the establishment of a director-at-large for a one-year term who shall be the outgoing division chairman, and fixing the term of regular directors at two years. Also directors elected from the areas of the local rubber groups shall have as alternates the defeated candidates in the election.

Dr. Semon then reported on a revision concerning the nominating committee which will now require that this committee of five members be appointed by February 1 each year and make its report at the spring meeting of the Division each year.

It was also proposed that the fiscal year for the Division be the period March 1 through February 28 of the following year and that ten days before the fall meeting of the Division the treasurer submit a report on the annual budget.

It was recommended that the present Library committee be replaced by two commitees, one a Library policy comittee of five members, with the Division treasurer as an ex-officio member, which would concern itself with policy and budget matters, and the other a Library operating committee consisting of one member of the Division as chairman and others involved in operating the Library.

All these revisions were approved by a voice vote, following which a motion was made that the steering committee of the Division appoint an interim director from Canada for 1956. This motion was also passed.

J. H. Fielding, Armstrong Rubber Co., chairman of the tellers committee, next reported on the results of the balloting for officers and for directors from certain of the areas of the sponsored local rubber groups, as follows: officers for 1956, chairman, A. E. Juve; vice chairman, B. S. Garvey, Jr., Sharples Chemicals Division, Pennsylvania Salt Mfg. Co.; treasurer, George E. Popp, Phillips Chemical Co.; secretary, A. M. Neal, Du Pont. Directors elected this year from areas of local rubber groups were reported as: Connecticut, C. A. Larson, Whitney-Blake Co.; Detroit, H. W. Hoerauf, United States Rubber Co.; Northern California, J. M. Holloway, Mare Island Naval Shipyard; Philadelphia, G. J. Wyrough, Wyrough & Loser; Rhode Island, U. J. H. Malo, Crescent Co.; Southern Ohio, E. N. Cunningham, Precision Rubber Products Corp.; and Washington, R. D. Stiehler, National Bureau of Standards. A total of 1,201 ballots was cast.

Chairman Ball made the request that the new Division chairman, Mr. Juve, appoint an associate editor to assist Rubber *Chemistry and Technology* editor, C. C. Davis. Also, it was recommended that detailed editorial work for *RC&T* be transferred to the Division Library as soon as possible and that the chairman of the Library committee make the necessary arrangements for this transfer.

H. I. Cramer, Sharples Chemicals Division, was appointed councillor of the Society, with retiring Division Chairman John Ball as alternate, since Dr. Semon's term as councillor has expired. Chairman Ball paid tribute to Dr. Semon's work for the Society as councillor from the Rubber Division during the past three years.

In the absence of T. A. Werkenthin, Bureau of Ships, Navy Department, chairman of the membership committee, Mr. Ball read this report. The Division gained 242 new members during the year, but 182 members did not renew their membership. Total of regular, associate, and subscriber members of the Division is now 3,550, of whom 2,300 are voting members. The new chairman of the membership committee for 1956 will be H. W. Hoerauf.

The Technical Sessions

The technical sessions, which began on the afternoon of November 2 with Division Chairman John M. Ball presiding, were highlighted by several important presentations, the invited paper on "The Technical Manpower Situation," by A. W. Davison, Engineer Manpower Commission, on the same afternoon; the Goodyear Medal address, "Specifications for a Rubber Chemist," by R. P. Dinsmore, Goodyear Tire & Rubber Co., on the morning of November 3; and the papers on "Ameripol SN—A Synthetic *Cis*-Polyisoprene," delivered by F. K. Schoenfeld, B. F. Goodrich Co.; and the paper, "A *Cis*-Polyisoprene Having the Molecular Structural Features of *Hevea* Rubber," by F. W. Stavely, Firestone Tire & Rubber Co., which were the special features of the session on the afternoon of November 3.

Chairman Ball in his introductory remarks at the beginning of the first session emphasized that the sixty-eighth meeting of the Division in Philadelphia promised to be one of the best because of the papers mentioned in the preceding paragraph and the many others included in the program. He paid tribute to the work of the local committee on arrangements headed by B. S. Garvey, Jr. The rating system initiated at the meeting in May of this year to determine the "best paper" presented at this meeting would be continued, he said.

The Chairman expressed the appreciation of the Division for the flashlight indicator presented for use of the speakers in describing the material on their slides, a gift from an anonymous donor.

In the first paper on the program, a new test for ozone cracking was described by H. M. Leeper, Monsanto Chemical Co., which employs a thin rubber ring looped over a support and weighted on one end while exposed out-of-doors. As the weight pulls the ring down, the stretching force on the narrowing cross-section becomes greater and greater, and the test has been effective in evaluating several antiozonants developed by Monsanto.

A comprehensive study of the effect of various stabilizers, fillers and extenders for chlorosulphonated polyethylene (Du Pont "Hypalon") was presented by H. A. Winkelmann. The colored "Hypalon" compounds were made by blending with natural and GR-S type synthetic rubbers.

The effects of gamma radiation on rubber was the subject of a paper by J. W. Born, B. F. Goodrich Co., who emphasized that the atomic age for rubber has begun. He explained that the work reported in this paper was taken from WADC Report 55-58, Wright Air Development Center, Dayton, O., and had been done for the Air Force at the Goodrich Research Center.

"Technical Manpower Situation"

In his paper entitled "The Technical Manpower Situation," Dr. Davison first emphasized that the supply of technologists has been falling off at an alarming rate. While the 1955 requirements of our industry call for 40,000 engineers, 50,000 scientists (including science teachers) and 5,000 Ph.D. graduates, we actually produced less than 20,000 engineers, 12,000 scientists, and 1,500 Ph.D.'s. We cannot ignore the technical manpower shortage since our form of civilization is closely linked with the abundant technological advancement, maximum personal welfare, and greatest opportunities for advancement lie in careers in science and engineering for our young people, and Soviet Russia is believed to be spending one-fifth of her entire budget on education, with emphasis on mathematics and science.

Russia has already won the battle of numbers of engineering and scientific graduates since in 1955 it graduated 54,000 engineers, against our 19,000. In the United States about 1,800,000 boys attain the age of 18 each year, of which only 17% have intelligence ratings of 120 or better, from which must come our future leaders in science and engineering, law, business, Armed Services—everything. Out

of these 306,000 young people, only 50% will enter college, and we lose 60% of these for various reasons including inadequate preparation, financial resources, etc. Only 61,200 young college graduates are left to spread over all the areas indicated, and it is wishful thinking to believe that we can come up with an adequate number of scientists and engineers unless we do something about it, Dr. Davison said.

Two separate problems are involved: one is a short-term effort to persuade more of the men and women already in college to become scientists and engineers, and the other is a long-term effort which involves providing more competent science teachers in the secondary schools.

Dr. Davison also emphasized several ways in which his audience and their companies could help improve the situation in the secondary schools, such as, support salary increases for all teachers, help teachers find summer employment, industry-sponsored seminars in science, support for college summer programs for teachers and support for industry-education days on which teachers and students may visit industrial establishments.

In addition to urging his listeners to make sure that schools in their local areas had adequate buildings and laboratories and equipment, the speaker urged them to serve on school boards whenever possible, to support science fairs and exhibits, and to foster high school vocational guidance days.

Other Early-Session Papers

L. R. Serberg, Three-T-Fleet, in discussing factors influencing the duplicability of tire road wear, emphasized the many variables involved in tire testing and that some variables may be controlled and some may not. Design of the tests and statistical methods used in analyzing the data obtained are of equal importance. The influence of wear severity, wet roads, and temperature was considered.

According to D. B. Merrifield, Monsanto, by the use of a dithioamine vulcanizing agent (Sulfasan R) and a "sterically hindered hydroquinone" (Santovar A) as a protective agent, white or light-colored rubber products may be made that will retain their brilliance and will not discolor enamels or other materials with which they may come in contact. This combination has not been used previously and is nominal in cost.

R. L. Zapp, Esso Research & Engineering Co., described new techniques to improve the compatibility of Butyl with GR-S type rubbers so that satisfactory vulcanizates may be prepared, some of which are in the class of semi-ebonites.

K. E. Polmanteer, Dow Corning Corp., presented information on vinyl-substituted polysiloxanes which can be vulcanized with sulfur or sulfur bearing accelerators. Thiuram disulfides were indicated as most active accelerators, but zinc oxide and organic acids inhibit and retard vulcanization of this type of silicone rubber.

F. Lyon, Columbian Carbon Co., in discussing the effect of carbon black on the oxidation of rubber, emphasized that in contrast to the accelerating effect of carbon black on the oxidation of sulfur vulcanizates, in rubber as well as other polymer systems, carbon black can inhibit or accelerate oxidation and polymerization reactions, depending on the other compounding ingredients involved. By controlling the action of carbon black in the compounds service life of products may be improved.

Goodyear Medal Address

"Specifications for a Rubber Chemist," the 1955 Goodyear Medal Award address by Dr. Dinsmore, was presented on the morning of November 3.

The belief that successful management of the present and future industrial society depends to an important degree on competent engineers and scientists, of which there is an existent and prospective shortage, prompted the Medalist to devote his address to the rubber chemist and pay tribute to his versatility and importance to a large and vital segment of our industry.

This year's Goodyear Medal address was in the form of a guided tour of a modern rubber laboratory in which Dr. Dinsmore had as his guide "Dr. Elastomer," an imaginary character experienced in all branches of rubber chemistry. Starting with the latex laboratory, the tour included laboratories devoted to synthetic rubber, compounding, high-polymer chemistry, organic chemistry, physics, physical testing, fabric and fiber research, radiation physics, and applied statistics.

In the latex laboratory Dr. Dinsmore inquired of his guide, "This equipment is mostly for physicists. How is the rubber chemist involved?"

"Dr. Elastomer" replied, "The rubber chemist must understand these methods and the significance of the results in order to do an intelligent job of specifying the production, application, and required improvement for latex of all types. After all, the latex is the foundation of all our rubber work. We must know all about the individual particles, how to protect them, modify them, agglomerate, coagulate, vulcanize—all these things so we can either use latex in that form or make good rubber from it."

A. W. Davison, vice chairman, Engineering Manpower Commission, addressing the Division on "The Technical Manpower Situation"

Similar comments by "Dr. Elastomer" and observations by Dr. Dinsmore developed in the course of the tour of the many other laboratories involved. For example, as Dr. Dinsmore observed in the synthetic rubber laboratory, now that many rubber goods manufacturers make their own rubber, the experience of the chemist must start with the raw materials for his rubber and carry through to the final rubber products, which policy is making life more complicated for the rubber chemist.

In the compounding laboratory the present-day complexity of problems involved in reinforcing, vulcanizing, extending, plasticizing, and protecting against deterioration the many different rubbers used was obvious.

Particularly pertinent was Dr. Dinsmore's comment in the high-polymer laboratory that high-polymer scientists must at times feel frustrated because new and diverse types of rubber are being discovered faster than their theories of vulcanization can keep step.

Also, in commenting on the men working in the laboratory devoted to radiation physics, the speaker pointed out that these physicists are just getting equipped to carry on more extensive work, and their influence will increase greatly in the next few years.

Similarly, "Dr. Elastomer" explained that in this day of expanding problems and shortage of trained scientists, the statistician might well prove to be of untold value.

Finally, as the tour was completed, Dr. Dinsmore reflected that "Dr. Elastomer" must be the only man in the world who could claim to be fully experienced in all branches of rubber chemistry. And yet numerous rubber chemists must be familiar with a large portion of this great field of technology in order competently to carry on their jobs.

Concluding, Dr. Dinsmore paid tribute to the rubber chemist as an important figure in our industrial society and added that whether he draws from the riches of the past or prepares for the brilliance of the future, he may walk in the dignity of a true servant of mankind.

New Synthetic Rubbers

Of unusual and historical significance were the papers presented on the afternoon of November 3, particularly those dealing with the synthetic *cis*-polyisoprene as presented by the Goodrich and Firestone companies. The dream of the rubber chemist for more than half a century appears now to have been realized with the preparation by organic chemical synthesis of a rubber with about the same molecular structure and physical properties of natural *Hevea* rubber.

Of special significance also was the first paper on this Thursday afternoon pro-

gram which gave details about a durable, oil-resistant, low-cost synthetic rubber which has been produced by a chemical process starting with rubber scrap. It is called "carboxylic rubber," and, as explained by Joseph Green, U. S. Rubber Reclaiming Co., four classes of the useful new rubber have been produced, depending on the types of scrap used as raw materials and the particular chemicals mixed with them. Maleic anhydride with scrap rubber and certain unsaturated compounds, when processed in a specially designed extruder at about 400° F. for three minutes, produces one of the four grades of this new rubber. They can be extended with oil or supplied as oil-extended rubbers, show versatility with respect to methods of vulcanization, and are particularly suited for blending with nitrile and neoprene rubbers.

In a series of three papers, all of which were presented by F. K. Schoenfeld, in behalf of Goodrich-Gulf Chemicals, Inc., the first detailed description of the properties and performance of Ameripol SN, a synthetic *cis*-polyisoprene, was given. He said that catalyst systems, based on information purchased from Prof. Karl Ziegler, have been applied to isoprene monomer systems, and modifications have been developed such that either *cis*-1,4-polyisoprene or *trans*-1,4-polyisoprene can now be prepared at will. A maximum molecular weight of 600,000, as compared with a maximum of 2,250,000 for unmilled pale crepe, was indicated. Infrared absorption spectrum, protected with an antioxidant, duplicates that of the natural product, and X-ray diffraction patterns show identical crystal structures.

Comparative laboratory evaluation tests on pure gum, carcass and tread stocks indicate a virtual identity in the performance of Ameripol SN and *Hevea* rubbers, Dr. Schoenfeld said. Factory evaluation and extensive road testing of tires suggest that Ameripol SN heavy-duty tires will perform as well as similar *Hevea* tires since the former shows low hysteresis values in heavy-duty truck tire stocks. Banbury mixing in the factory presents no problem, and stocks of the new rubber process well on factory calenders and extruders.

In the discussion period following the presentation of these papers it was revealed that Ameripol SN will be available from Goodrich-Gulf Chemicals in the second quarter of 1956. It was estimated that the price might be in the range of 40-45¢ a pound.

F. W. Stavely, Firestone Tire & Rubber Co., next described the *cis*-polyisoprene developed by his company, called Coral rubber. He explained that Coral rubber was made by mass polymerization with a lithium metal catalyst, contained about 94% *cis*-1,4 polyisoprene, 6% *cis*-3,4 and no *trans*-1,4 or 1,2 structure. The physical properties of Coral rubber approximate those of natural rubber in respect to high gum tensile strength, low heat build-up, retention of strength at elevated temperature and tread wear. It excels natural rubber in resistance to cracking in tire treads, to oxygen absorption, and thermal stability.

It was also explained that isoprene of high purity refluxed over sodium was required. Coral rubber with molecular weight greater than *Hevea* natural rubber has been produced, and analytical data support the fact that this new rubber has a high proportion of *cis*-1,4 head-to-tail structure, and that this feature is desirable in attaining the properties that are characteristic of natural *Hevea* rubber.

Division Chairman John M. Ball presenting 1955 Goodyear Medal to Ray P. Dinsmore; Arthur W. Carpenter, on left, spoke at Division banquet on "The Man and His Work"

Dr. Stavely mentioned that the synthesis and development of Coral rubber were a closely guarded secret at Firestone until August 22 of this year, when H. S. Firestone, Jr., announced its discovery and advised that details of the new rubber and samples would be made available to the Armed Services and to rubber manufacturers and others who participated in the government synthetic rubber research program.

New information on properties and applications of another new rubber of the fluorocarbon type, Kel-F, of M. W. Kellog Co., were discussed by D. R. Wolf, of that company. Compounding with carbon black and silica pigments and vulcanization with benzoyl peroxide together with improved fabricating methods were covered.

This session was concluded with a paper on a new polyacrylic ether-ester elastomer, Vyram, of Monsanto, which was shown to have exceptional resistance to swell in a wide range of solvents and hydraulic fluids.

The Division Banquet

The banquet of the Division was held on the evening of November 3 and was preceded by the Suppliers Cooperative Cocktail Party. C. A. Bartle, Du Pont, was in charge of the arrangements for the cocktail party, and M. A. Youker, also of Du Pont, handled the arrangements for the banquet.

In his introductory remarks Chairman Ball mentioned that the last meeting of the Division in Philadelphia took place in 1926, but of even greater significance was the fact that the first meeting of the Division was held in Philadelphia in 1919. He went on to refer to some of the papers given at the 1919 meeting and mentioned the first Division chairman, J. B. Tuttle, and the first secretary, A. H. Smith.

Distinguished guests of the Division, A. W. Davison, vice chairman of the Engineering Manpower Commission and author of the invited paper on "Technical Manpower"; J. Le Bras, French Rubber Institute; D. Parkinson, formerly of Dunlop Rubber and now with United Carbon Co.; and Alden H. Emery, executive secretary of the ACS, were introduced. Division officers and directors and members of the local committee seated at the head table then introduced themselves in the manner of the panelists of the television program, "What's My Line."

Prior to the Goodyear Medal Award ceremonies a certificate of appreciation for his five years of service as treasurer of the Division was presented by Mr. Ball to Amos W. Oakleaf, Phillips Chemical Co., who retired with this meeting as treasurer. Mr. Oakleaf received a gift certificate from the Division as a further expression of appreciation.

Arthur W. Carpenter, a member of the Division and past president of the American Society for Testing Materials and secretary of that Society's Committee D-11 on Rubber and Rubber-like Materials, classmate and long friend of R. P. Dinsmore, 1955 Goodyear Medalist, was next introduced. Mr. Carpenter then spoke on "Ray P. Dinsmore—The Man and His Work."

Mr. Carpenter mentioned his association with Dr. Dinsmore while they were both students in chemical engineering at Massachusetts Institute of Technology, and among the Medalist's many achievements described him as "one of the best read men in the rubber industry." He also described the trip Dr. Dinsmore made from MIT to Akron, O., on a motorcycle in 1914 on his way to his job with the Goodyear Tire & Rubber Co., when only a few miles from his goal a tire failure made it necessary for him to stop overnight and finish the trip the next day.

Highlights in Dr. Dinsmore's professional career during his years with Goodyear were recounted. Many of these details appeared in our June, 1955, issue on page 358, in connection with our announcement of the selection of Dr. Dinsmore as the 1955 Goodyear Medalist, and in the October 17, 1955, issue of *Chemical and Engineering News*, page 4422. The Medalist's many honors and achievements are almost as well known to his many friends and associates in the rubber and related industries as to himself.

The Goodyear Medal for 1955 was then conferred on Dr. Dinsmore by Mr. Ball after James C. Walton, chairman of the Goodyear Medal Award committee, had presented him to Mr. Ball.

The banquet program concluded with a variety show.

Final Technical Session

The final technical session on the morning of November 4 included two papers from the Government Laboratories at the University of Akron, the first of which, by W. K. Taft on the control of polymer breakdown in oil-polymer masterbatches, showed the relation between oils used and iron content of the latices, and the extent of breakdown of the resultant dry polymer.

Interesting information of the relation between oil composition, as determined by

ultra-violet absorbencies and the fact that with some polymers breakdown on milling was found to be directly related to the "aromaticity" of the oil, was reported by June Duke, of the Government Laboratories. It was pointed out in the discussion of this paper that the extent of breakdown was not always detrimental.

This session concluded with papers on a novel and ingenious glass polymerization apparatus for laboratory work, on work at the National Bureau of Standards on thermal degradation of rubber in vacuum as a means of analysis of rubbers, the use of the swelling method for determining degree of cure, and mixing studies on zinc oxide Banbury mixing.

Office of Historian

An unscheduled paper on the Friday morning program was given by the newly appointed historian of the Division, E. V. Osberg, National Polychemicals Co., who reported on his duties, as outlined in connection with his appointment, and described some of his plans for developing a report to be given at a future Division meeting.

It was mentioned that records of the Division from 1930 to date were in good shape, but that pre-1930 records stored at the University of Akron seem to have disappeared. In connection with the search for these records, Mr. Osberg asked for help from the old-time members of the Division, as well as for such additional information as might be helpful. Biographical records of past chairmen, background of the Goodyear Medal Award, and the history of the local rubber groups are among the plans of the historian for future work.

Mr. Osberg mentioned that A. H. Smith, former secretary of the Division, had been located and would help in completing the records of the happenings of the early years of the Division of Rubber Chemistry, beginning with its organization in 1919.

Juve Assumes Chairmanship

The final event on the program on Friday morning was the retirement of the 1955 chairman, John M. Ball. The 1956 chairman, Mr. Juve, paid tribute to Mr. Ball for improving the meetings of the Division by instituting the "Best Paper Award," arranging for invited papers on non-technical subjects, introducing a timing device to keep speakers on schedule, and many other items which have helped in this connection. Credit was given the retiring chairman for creation of the Office of Historian. In presenting a certificate to Mr. Ball to commemorate his service as chairman in 1955, Mr. Juve congratulated him on the excellent job he had done.

In accepting the certificate, Mr. Ball expressed his appreciation for the help he had received from the other officers and members of the Division, particularly the secretary, Dr. Neal, and the treasurer, Mr. Oakleaf. The new vice chairman, Dr. Garvey, was also again introduced, and he took the occasion to thank the members of the local committee for the Philadelphia meeting for their work as chairman of that committee.

ASTM D-11 Subcommittee 13 Synthetic Elastomers November 1 Meeting

A meeting of subcommittee 13 on synthetic elastomers of Committee D-11 on Rubber and Rubber-like Materials of the American Society for Testing Materials was held at the Engineers' Club, Philadelphia, Pa., November 1. B. S. Garvey, Jr., Sharples Chemicals Division, Pennsylvania Salt Mfg. Co., chairman of subcommittee 13, presided at this meeting, which heard reports from the several sections on sampling, chemical tests, physical tests, latex test methods, nomenclature, and reference materials.

Sampling

Section 1 on sampling had no report owing to the fact that the work of statistical subcommittee 28 of D-11 has not been completed in connection with sampling procedure. It was decided, however, that it was the responsibility of the section to recommend a procedure for obtaining, blending, and preparing a dry sample for tests to be made on dry polymers. Data from synthetic rubber producers on sampling procedure and the ability of these procedures to provide adequately samples from which conformance to specifications may be determined are to be obtained.

Chemical Tests

Section 2 on chemical tests for solid polymers reported that a letter ballot is being circulated in subcommittee 13 on proposed test methods for moisture, ash, carbon black in masterbatch, bound styrene, organic acid, soap, and antioxidant. Results of this letter ballot will become available some time after November 21. A request for additional test methods for styrene-type rubbers desired by members of the subcommittee was a part of this letter ballot.

The desirability of a method for determining oil content of oil-extended styrene rubbers was discussed, and section 2 was requested to try to develop such a method, useful to both producers and consumers, that would determine oil content in percentage and also the type of oil which was used.

Physical Tests

Section 3 on physical test methods for solid polymers reported differences of opinion resulting from letter balloting subcommittee 13 on modifications of ASTM D15-54T, Methods of Sample Preparation for Physical Testing of Rubber Products, and D412-51T, Methods of Test for Tension Testing of Vulcanized Rubber. Among these differences of opinion were the matter of the length of the rest period between mixing and curing, the type of compound to be used, and the cure temperatures to be used. The recommended temperature of 302° F. (150° C.) for curing was rejected because of insufficient experience with curing at this temperature. A temperature of 293° F. (145° C.) was suggested as a possible compromise and as one that would permit comparison of results on an international basis.

Latex Test Methods

Section 4 on latex test methods was expanded from four members to ten, with equal representation between producers and consumers. A letter ballot in subcommittee 13 on methods for sampling, total solids, residual styrene, pH, surface tension, viscosity, coagulum, and bound styrene resulted in approval for methods for residual styrene, pH, and surface tension, but negative votes on the several other methods will have to be resolved.

It was emphasized that more work will be required before additional methods can be put in shape for approval by ASTM, and in this connection greater cooperation from consumer representatives will be required.

Nomenclature

Section 5 on nomenclature reported the following results of a letter ballot in subcommittee 13 covering a generic name for butadiene-styrene copolymers, method of identifying different types of former GR-S rubbers, and type descriptions and/or specifications for ten or more representative GR-S types.

The term "styrene rubbers" and the abbreviations "RS" and "RS Latex" for butadiene-styrene copolymers formerly made by the Office of Synthetic Rubber, Federal Facilities Corp., was approved for letter ballot in Committee D-11.

Similarly, the term "butadiene rubbers" and the abbreviations "RB" and "RB Latex" for butadiene polymers and latices were approved for letter ballot in D-11.

The numerical designation used for GR-S as of March 24, 1955, by the Office of Synthetic Rubber were also approved for letter ballot in D-11.

The chairman of subcommittee 13 was authorized, as a result of the section 5 letter ballot, to appoint a new sectional committee to set up rules governing the issuance of numerical descriptions for new RS and RB rubbers and to set up a procedure for issuing such numbers in agreement with these rules. This new sectional committee 7 is to be called the code number section and will have five producer representatives, five consumer representatives, and a general interest chairman. G. C. Maassen, R. T. Vanderbilt Co., was appointed chairman of section 7.

The 16 type descriptions and specifications for representative RS and RB rubbers received about 16 affirmative and five negative votes. Dr. Garvey pointed out that these five negative votes might be construed as a veto on any further efforts along this line by subcommittee 13, but because of the comments which accompanied these negative votes, the general agreement on accepting the numerical designations of the FFC of March 24, 1955, and approval for the formation of section 7 mentioned above, he felt a general agreement on type descriptions and specifications might still be reached.

Section 7 will try to produce an alternate proposal to the former FFC specifi-

cations, gain acceptance of the FFC specifications as they were in April, 1955, or report that voluntary standardization and specifications for RS and RB rubbers are not possible.

Standard Reference Materials

Section 6 on standard reference materials recommended that a lot of 30,000 pounds of GR-S X-761 type be supplied gratis to the National Bureau of Standards by the RS producers; the cost of certifying this rubber for standard samples will be absorbed by NBS. The cost of 30,000 pounds of this rubber would amount to about $7,500, and RS producers will be asked to donate to this amount in the ratio of rated plant capacities at time of disposal. NBS can absorb the $3,600 testing and certifying cost only once until proposed legislation which would give the Bureau a revolving fund is passed. NBS will sell standard samples at a price based on cost of testing plus handling charges. It was estimated that this lot of standard samples of GR-S X-761 type would last the industry about 18 months.

The recommendation was approved by subcommittee 13, and Dr. Garvey and S. R. Doner, Raybestos-Manhattan, Inc., chairman of section 6, are to draft a letter to each RS synthetic rubber producing company, explaining the need of a standard sample and asking each company to participate financially in obtaining the standard rubber sample for NBS.

Availability of GR-S Specifications

The special section concerned with the availability of "Specifications for Government Synthetic Rubbers," of the Office of Synthetic Rubber, reported that these specifications were available from FFC up to September 15, 1955. They are now available from the Purchase Specifications & Standards Branch, Code 357, Bureau of Ships, Navy Department, Washington 25, D. C.

Dr. Garvey read a letter written to the Bureau of Ships in reply to an inquiry regarding the work of subcommittee 13 with special reference to test methods and specifications for RS and RB rubbers. Approval of this letter by subcommittee 13 was voted, and the ASTM headquarters will inform the Bureau of Ships of this action.

Statistical Lectures Set

An intensive seven-day short course entitled "Statistical Methods for Research Workers in Industry and the Physical Sciences" will be given at the Institute of Statistics of North Carolina State College, Raleigh, N. C., February 12-18, 1956. Three series of lectures on elementary statistical analysis, regression analysis, and experimental design are planned. Guest lecturers include W. G. Cochran, Johns Hopkins University; S. L. Crump, University of Rochester; and J. S. Hunter, American Cyanamid Co.

Inquiries should be directed to the Institute at Box 5457, Raleigh.

Engineers Council to Meet

The second annual General Assembly of Engineers Joint Council will be held at the Hotel Statler, New York, N. Y., January 26 and 27, and will deal with such topics as the problems of utilizing engineering manpower, the growth pattern of the engineer, and the engineering aspects of the Hoover Commission reports.

The January 26 meeting will be devoted to a discussion of the use of scientific and engineering manpower with respect to selective service, the Office of Defense Mobilization, education, and industry. Representatives of government and industry are included in the panelists who will cover most phases of engineering manpower usefulness.

The January 27 session will include discussions by speakers and panels from education and industry who will consider the problems of engineering education, employers' responsibilities toward the engineer, and the engineer's place in research and development, with special emphasis on the nuclear power field.

Inquiries should be addressed to Engineers Joint Council, 29 W. 39th St., New York 18, N. Y.

Dow's Britton Named 1956 Perkin Medalist

Edgar C. Britton, director of the Edgar C. Britton Research Laboratory of Dow Chemical Co., Midland, Mich., has been chosen 1956 recipient of the Perkin Medal of the American Section, Society of Chemical Industry, according to Clifford S. Rassweiler, Johns-Manville Corp., chairman of the organization's award jury.

Widely considered the highest award in American industrial chemistry, the Perkin Medal will be given Dr. Britton at a dinner in his honor some time in September, 1956, as part of a celebration commemorating the centenary of the development of the first synthetic dye by Sir William Henry Perkin, after whom the medal was named. The Medal was established in 1906 and has been awarded annually since.

Dr. Britton, 64, is to be given the award for his general contributions to the American organic chemical industry. He first became associated with Dow in 1920 as research chemist, and is now secretary and director of the company. He was president of the American Chemical Society in 1952 and currently holds membership in the American Association for the Advancement of Science, American Institute of Chemists, the Chemical Society (London), and the Society of Chemical Industry, among others.

Dr. Britton's professional achievements include the commercial pioneering of the silicone resin industry; contributions to the early synthetic production of phenol; the synthesis of eight of the essential amino acids, including methionine, the only essential amino acid now in commercial production; and contributions to the production of synthetic dyes, synthetic rubber, and pharmaceuticals. He has been granted more than 300 United States patents on his work.

Davidson Gets Medal

Joseph G. Davidson, vice president, Union Carbide & Carbon Corp., New York, N. Y., received the Chemical Industry Medal for 1955 in recognition of his "conspicuous services to applied chemistry" at an award-dinner given by the American Section of the Society of Chemical Industry, sponsor of the medal, at the Waldorf-Astoria Hotel, New York, N. Y., October 28.

The medal was bestowed by Wallace P. Cohoe, past president, Society of Chemical Industry (international), after presentation of Mr. Davidson by Morse G. Dial, president of Union Carbide. Presiding as chairman of the American Section was Raymond Stevens, vice president, Arthur D. Little, Inc.

In accepting the award, Mr. Davidson gave credit for the rise of the petrochemical industry in this country to the incentive and daring of management. Such progress is apparent in the figures for production of organic chemicals in the United States, which went from 14 million pounds annually in 1920 to a level of 3.2 billion pounds for the current year, he said.

Describing the experiences of himself and his associates in developing ethylene glycol and its derivatives, Vinylite, polyethylene, butadiene, and other related products, Mr. Davidson outlined the many factors in any such development that can cause difficulty even when the fundamental chemistry of the process is thoroughly understood.

Plan Products Exposition

The nation's first National New Products, New Methods & Patents Exposition will be held in Detroit, Mich., in the Fall of 1956, it has been revealed by Thomas Reid, Ford Motor Co., general chairman of the event. Specific dates and the site will be announced later.

The basic purpose of the show is to "develop new business, to help existing businesses cut costs and diversify production by making easily available the results of costly research and inventiveness in the field of new products and new methods, and to help stabilize employment at new and high levels," Mr. Reid explained.

The Exposition will be under the combined sponsorship of civic, management, and labor organizations in cooperation with private industry and state, municipal, and federal government agencies.

The success of a so-called regional pilot show of a similar nature, held in Detroit in 1954, prompted the planned nation-wide exposition, Mr. Reid further declared.

"A careful check of visitors several months after attending the show revealed case after case where the show had resulted in firms diversifying their production and creating new jobs," he pointed out.

Athel F. Denham, who is said to have helped build several of the nation's top industrial expositions in the past 15 years, has been named exposition director. Offices of the show will be at 927 Book Bldg., Detroit.

Special Program of Rubber & Plastics Division, ASME, at Chicago

The Rubber & Plastics Division of the American Society of Mechanical Engineers had a special program as a part of the Diamond Jubilee Meeting of the parent Society in Chicago during the week of November 14. The Rubber & Plastics Division program on November 16 was made up of three sessions: the first was entitled, "Broadening the Applications of Rubber;" the second had the theme, "The Rubber and Plastics Engineer in Commerce and Industry;" and the third was devoted to "Broadening the Applications of Plastics."

The chairman of the Division for 1955 was Gordon B. Thayer, Dow Chemical Co. In accordance with the procedure of the Society, however, different chairmen and vice chairmen were selected to preside at the three technical sessions. Mr. Thayer presided at a meeting of the executive, advisory, and general committees of the Division held at luncheon on November 16, at which the 1956 Division chairman, R. G. Seaman, RUBBER WORLD, and secretary, F. W. Wehmer, Minnesota Mining & Mfg. Co., were introduced.

Also, as a part of the procedure of the Division, the technical chairman for the Chicago meeting, William R. McLain, Kusan, Inc., presented a summary of the ten papers given at the end of the third session on the evening of November 16; Mr. McLain's summary provides the basis for our report of these papers.

Rubber Session

H. A. Winkelmann, Dryden Rubber Division, Sheller Mfg. Corp., was chairman of the first session, assisted by Paul McGervey, The Richardson Co.

"Rubber Applications in the Home and Industry," by E. J. Joss, United States Rubber Co., was the first paper on the program. Consumption of rubber per family in the United States in 1954 at 130 pounds was mentioned in connection with the growth of the use of rubber products in home and industry.

The growth and the progress of the use of rubber in industry were covered by analyzing various applications as associated with specific properties, such as: energy absorption, flexibility and compressibility, wear resistance, chemical inertness, electrical insulation and conduction, thermal insulation, etc. Examples discussed under the several property headings provided a valuable review of the wide scope of applications to all phases of the industrial community.

The paper provided, in addition, a good summary of recently developed new rubber materials and commented upon the use of the unusual properties of many of these new rubbers to the possible solution of problems of the present and future for rubber products for home and industry.

"Rubber Applications in Transportation —Past, Present, and Future," by H. H. Waters, Firestone Tire & Rubber Co., was the next paper on the program.

This paper presented a brief review of the history of the contributions of rubber to transportation from early times to today's tubeless tire. The growing acceptance of this latter development and its advantags were discussed. The tremendous contribution of synthetic rubber to transportation was emphasized.

Automobile manufacturers will demand and get a 14-inch tire with increased cross-section for use on 1957 models, this speaker stated, and predicted the general use of tubeless truck tires in 1956. The eventual adoption of tubeless tires for farm equipment, because of their greater resistance to body breaks, was also pointed out.

The use of full-depth foam rubber cushioning for transportation seating and the increased use of foam rubber to improve the safety characteristics of automobiles were mentioned.

The greater use of the air spring, a rubber-and-fabric air chamber designed to replace steel springs in vehicles suspensions, was suggested because of the improved ride that can be obtained with this type suspension.

Development of a new synthetic rubber comparable to natural rubber promises to lessen and even eliminate the government's natural rubber stockpile, it was said.

In conclusion, Mr. Waters stressed the urgent need of more and better roads and indicated where the use of rubber in this application could be a great value.

"Engineering Developments in Rubber, September, 1954 — August, 1955," by Lillian Cook, University of Akron, and Leora E. Straka, Goodyear Tire & Rubber Co., was the third paper on the program. This paper is a regular feature of Division meetings and is a joint contribution of the Rubber Division, ACS Library at the University of Akron and the library at the Goodyear company. Dr. Straka presented the paper.

Contributions to the literature concerning the duplication of natural rubber were well summarized with a comparison of the basic properties of each rubber given. Also of special interest was a review of the vulcanization of rubber by gamma radiation, and the development of special materials to be added to rubber stocks to protect them from destructive effects of atomic radiation.

This paper also discussed tire design, the application of rubber to roads, industrial seals, and the chemistry, compounding, and testing of rubber materials.

General Session

The chairman for the general session was Glen Neely, Richardson Co., who was assisted by Prof. Robert Zinn, Northwestern University. The present and the future status of the rubber and plastics engineer in the fields of education, research, production, and sales were discussed at this session.

"The Engineer in Education," by Prof. C. C. Winding, Cornell University, was the first paper of the general session. This speaker emphasized that the engineer in education faced with the rapid rate of technological progress in recent years has made the required changes in curricula by "splintering off" new specializations such as chemical and aeronautical engineering.

Engineering educators are now confronted with powerful public sentiment directed at altering engineering education still further in order to produce better engineers capable of carrying a bigger segment of modern civilization on their shoulders. Heavier emphasis on the basic and engineering sciences with the elimination, or reduction, of the arts and practices of engineering, but with a preservation of a study of the humanities, was suggested.

If more emphasis be placed on the four- or five-year curricula, in the manner indicated above, then education of a specialized nature beyond this point must be obtained in the graduate schools. Further, it indicates that the responsibility must and should be shouldered by industry in further training and education after employment, Professor Winding concluded.

"The Engineer in Research," by F. E. Reese, Monsanto Chemical Co., was the second general session paper.

This speaker made an effective analysis and comparison of the research engineer and the design engineer in modern industry, pointing out that the research engineer must be somewhat of a dreamer, bold, and perhaps unconventional; while the design engineer must use imagination in the application of known facts. The problem of supervision and intercourse between the two types of engineers was discussed in an interesting manner.

The evaluation of personnel as to suitability for research was covered, and the problem analyzing the results of the work of the research engineer was noted. Good examples of a typical engineering department organization, showing the relations between research and design engineering and the assignments of the various divisions and way in which cooperative work is done for mutual progress were presented in numerous charts and descriptions.

The increasing importance of the research engineer was stressed, but it was also pointed out that his real value depends on his ability to recognize the economic and other phases of the industry in which he is employed.

"The Engineer in Production," by Robert A. Merrill, U. S. Rubber, was the next paper on the program.

It was pointed out that the overall progress of industry, as well as the progress of our country, rested on engineering achievement as probably the most important factor. The speaker noted the various types of engineers who contribute to all phases of industry and production. With the trends toward more complete automation, greater demands are placed on engineers to provide simplified methods, machines, processes and controls.

Examples of engineering developments in the field of tire vulcanization were cited to show how the engineer in produc-

tion discharged his responsibility to provide greater productivity per man.

This paper covered the role played by the engineer in production and the increasing demands of the future. As the author summed it all up—"Production is engineering."

"The Engineer in Commerce and Industry—Sales," by Donald L. Gibb, Dow Chemical Co., was the last paper of the general session.

Mr. Gibb presented an effective picture of the position of the engineer with regard to sales. He showed the close tie that must exist between sales and engineering in modern industry and pointed out the importance of the engineer having a concept of sales and profits. An interesting analogy of the result of engineering without these factors being fully developed was drawn.

The importance of the profit system to the growth of the engineer, as well as to the overall economy, was emphasized. The technical chairman commented that this factor is often overlooked to the point that it becomes one of the major problems of industry to provide its engineers, as well as other key personnel, with a proper understanding of the profit system.

Plastics Session

The chairman for the plastics session was Gordon Kline, National Bureau of Standards. The vice chairman was Prof. C. W. Selheimer, Illinois Institute of Technology.

"The Use of Plastics in Home and Industry—Past, Present, and Future," by W. E. Manring, B. F. Goodrich Chemical Co., was the first paper of this session.

The proper selection and application of plastic materials, together with their proper combination with other materials, as a key to expanded use of plastics, were discussed. A comparison of the physical and other properties of plastics with relation to glass, steel, etc., was made by use of various charts and data.

A summary of uses of plastics in the building field included mention of the ten-year life expectancy of an overall skin of plastics applied to an external structure, and the development in construction applications of plastics piping, siding, glazing, facings, gutters, etc.

In industry the resistance of plastics to corrosion was considered to be of primary importance. Better information on possible service life and creep characteristics of plastic materials was said to be important to expanded use.

The unusually advantageous properties of plastics make them ideally suited for many specific applications, and as their properties, economics, and processes are better understood and developed, an ever-expanding use in the fields of home and industry will be realized, it was concluded.

"Plastics in Transportation," by K. K. Fligor, Goodyear, was the second paper.

The major use of plastics in transportation today is in the aircraft and automotive industries, this speaker said. Other uses in transportation include pipe for liquids and gases, conveyor belts for

Blackstone Studios

R. G. Seaman, 1956 chairman

movement of material in bulk, and marine applications.

The experimental and developmental uses of plastics in the automotive industry indicate wide future markets as the materials are adapted or developed to meet the requirements of these applications. Resistance to corrosion and the fact that the use of plastics in the manufacture of trailers and automobiles permits a lower center of gravity indicate good promise for wider use, it was said.

"Engineering Developments in Plastics, July, 1954—August, 1955," by Bryce Maxwell, Princeton University, was the concluding paper.

The changing face of the plastics industry by virtue of mergers, expansions, geographical location, etc., as applied to suppliers, fabricators, equipment manufacturers, was discussed.

Among the significant developments during the year in the field of raw materials were those in epoxy resins, silicones, phenolics, styrene copolymers, nylons, and polyurethanes. The importance of developments in the field of ethylene polymers was emphasized, with special reference to irradiation, production increases, and the introduction of low-pressure polyethylenes. It was noted that application of the Zeigler process to polystyrene and polypropylene has produced different-type materials that may be of considerable interest.

The need of increased dissemination of information and wider educational training for plastics at the college level was stressed.

Committee Meeting

At the luncheon meeting of the executive, advisory, and general committees, 1955 Chairman Thayer thanked the members of these committees for their help during the year.

Mr. Thayer mentioned the election of J. F. Downie-Smith, Iowa State College, past chairman of the Division, to the ASME council, which was due at least in part to the efforts of the Rubber & Plastics Division.

The annual report of the Division was read by R. W. Barber, St. Regis Paper Co., executive committee member. This reading of this report will become a regular feature of the annual business meeting of the Division.

C. H. Adams, Monsanto, a new member of the executive committee, was introduced. Murrey O. Longstretch, Dow Chemical, will be chairman of the plastics papers committee for 1956 and 1957, and W. M. Petry, University of Akron, will continue as chairman of the rubber papers committee for 1956. The Division secretary for 1956 is F. W. Wehmer, and the program chairman, Mr. Barber. R. D. Stiehler, NBS, will be annual report chairman.

Mr. Thayer then turned the meeting over to the 1956 Division chairman, R. G. Seaman, who paid tribute to the 1955 chairman as one of the most industrious and effective the Division ever had. Mention was made of the work of Mr. Thayer and Allen Gifford, Lord Mfg. Co., another past chairman of the Division, in developing an organization chart and operating manual for the Division, and Mr. Thayer and Mr. Gifford were asked to continue this work. A certificate from the Society and a rubber and plastics gavel from the Division's executive committee were presented Mr. Thayer in recognition of his service as 1955 chairman.

The 1956 chairman then outlined the plans of the Division for the coming year and announced tentative plans for participation at the meetings of the Society in Cleveland, O., in June, and in New York in November.

Baum Group Speaker

"Chemical Engineering Aspects of Emulsion Polymerization" was the subject of an address given by Sidney J. Baum, chemical division, Polyco department, Borden Co., Peabody, Mass., before the Elastomer & Plastics Group, Northeastern Section, ACS, at Science Park, Boston, Mass., November 15. Ninety members and guests attended.

Dr. Baum discussed the chemical engineering problems encountered in the design and operation of a multi-purpose emulsion polymerization plant. These problems, he said, are related to the unit operations of fluid flow, heat transfer, agitation, and filtration.

He gave the advantages and disadvantages of many designs of reactor installations, cooling jackets, condenser arrangements, safety devices, and instrumentation, and concluded with a discussion of the problems encountered in translating laboratory results to plant-scale operation.

Charles S. Frary, Jr., Boston Woven Hose & Rubber Co., introduced the speaker.

The meeting was attended by a group of chemistry students from Northeastern University, who had been invited for the occasion.

The next meeeting of the Group will be held at Science Park on January 17 and will be in the form of a symposium on "Specialty Latex Applications."

Silicone Rubber Talk Given by Naegle at Philadelphia

R. S. Naegle, Dow Corning Corp., presented a talk on "Current Application for Silicone Rubber" before the Philadelphia Rubber Group at the Poor Richard's Club, Philadelphia, Pa., October 28. The 132 members and guests in attendance also heard John Ball, chairman of the Division of Rubber Chemistry, ACS, discuss plans for the Division meeting held November 2-4, in Philadelphia.

The meeting was highlighted by the presentation of a $100 Savings Bond to Floyd E. Wiley, Firestone Plastics Co., for the best paper submitted upon the recent completion of the Group-sponsored rubber course at Villanova University, which he attended. Mr. Wiley's paper was entitled, "Vulcanization of Natural and Synthetic Rubber Gum Stocks." Making the award was A. J. DiMaggio, The Firestone Tire & Rubber Co., a member of the Group's executive committee.

Tracing what he called the phenomenal growth of the uses of silicone rubber during the past ten years, Mr. Naegle described the first quantity use of the material by the aircraft engine industry. This was as a coating for glass fabric and was a low-viscosity type of polymer loaded with a titanium dioxide filler. The application gave longer life and greater reliability to the gaskets made from the glass fabric.

Silicone rubber's use as fin stiffeners on aircraft engines followed, a milestone, Mr. Naegle pointed out, because it led to other developments in aircraft engine design. Next to be evolved were low compression-set silicone rubbers, with such applications as push-rod seals for aircraft engines and upper and lower seals on diesel engines for electric locomotives.

In 1949, Silastic 250 was introduced, a really rubber-like material with improved tear strength that was immediately adapted to such aircraft uses as seals and sponge gaskets. Also at about this time considerable improvement in the fillers used and better physical properties in the rubbers themselves were achieved.

Succeeding developments included Dow Corning Silica and Cabot's Cab-o-sil pigments, low compression-set stocks without toxic additives, hot air vulcanization of extruded and calendered silicone rubber parts, pressure-sensitive adhesive and air drying adhesive for bonding silicone rubber, room-temperature vulcanizing silicone rubbers for caulking and encapsulation, and flame-resistant types of silicone rubbers.

Applications of these developments included sponged aircraft seals, extruded aircraft seals, oil seals for automobiles, pharmaceutical vial stoppers, aviation wire, nipples for bottles, silicone-rubber insulating tapes for electric motors, and hot air ducts for aircraft.

The first silicone rubber tires are now in the development stage, and Mr. Naegle expects that the next five years will see the evolution of similar products where the durability of silicone rubber and retention of properties under service at high temperatures are important.

Following this address a color motion picture, "Rubber from Rocks," was shown, dealing with the compounding, fabrication, and applications of silicone rubbers. The presentation of the film was arranged by Fred Delnevo, Dow Corning Corp.

Philadelphia Rubber Group's A. J. DiMaggio, left, presenting $100 Savings Bond to Floyd Wiley, author of winning term paper in connection with the Group-sponsored Villanova rubber course

Goodyear Gives Paper Men Synthetic Latices Seminar

A technical seminar on synthetic latex polymers was presented to the Northwest paper industry by The Goodyear Tire & Rubber Co., chemical division, Akron, O., at the new research laboratories of Crown-Zellerbach Corp., Camas, Wash., October 21.

Attended by more than 100 representatives from some 25 companies in the paper, lumber, and paint industries, the seminar was concerned with the development, production, evaluation, properties, and uses of synthetic latices.

Hosts for the seminar were Jack Burton, manager of the development department, and Hutton Theller, manager of the research department, for Crown Zellerbach.

Principal speaker at the session was Herman R. Thies, general manager of Goodyear's chemical division, who gave an address on "The Synthetic Latex Industry."

Other Goodyear speakers and their subjects included J. D. D'Ianni, assistant to the vice president in charge of research and development, "Theoretical Consideration of Polymerization and Latex Characteristics" and "The Course of a Product Development"; R. S. Earhart, assistant general sales manager, chemical division, "Sources of Materials for Latex Manufacture," "The Production of Synthetic Latex," and "Types of Latex Commercially Available."

Also, Willard C. Smith, latex and adhesives section head, chemical materials development department, "Properties of Latex Systems and Evaluation Procedures" and "The Influence of Latex Variants on Important Performance Characteristics"; and Earl W. Scott, sales service representative for the chemical division's coatings department, "A Survey of Latex Applications and Potentials in the Coatings Fields."

New Rubber Era Predicted By G. E. Popp at Chicago

The annual per capita consumption of new rubber in the United States is about 19 pounds, compared to the world average of one pound, George E. Popp, sales manager of Philblack sales division, Phillips Chemical Co., Bartlesville, Okla., told 140 members and guests of the Chicago Rubber Group, meeting at the Furniture Club, Chicago, Ill., October 7.

Entitled "A New Era in Rubber," his talk dealt with the probable directions the expanding rubber market would take in the near future, in terms of economic growth and new technological developments.

He estimated that world rubber consumption by 1960 would approximate 3,500,000 long tons annually, a figure that would have to be met by increased production of synthetic rubber. The United States share of this consumption would be less percentage-wise than it is now, since it has been declining slowly for the last 35 years as world economic conditions have improved.

Mr. Popp pointed to the rising output of automotive vehicles as an example of the growing need of rubber. In this country there is now an average of one car for each family, he said, and rubber consumption per registered vehicle has been increasing over the years and is expected at least to hold its own in the future. The number of registered cars is expected to increase by about 15% in the next five years.

According to the carbon black executive, major scientific advances should occur in the following fields: new monomers, improvements in oil and carbon black masterbatches by use of better dispersants and improved techniques, synthesized natural rubber, new polymerization techniques and recipes, polyurethanes, isocyanates, vinylpyridine rubber, and improved packaging and handling.

Course in Quality Control

The ninth annual short course in "Quality Control by Statistical Methods" will be given by the College of Engineering, University of Illinois, with the cooperation of the Division of Engineering Extension, Urbana, Ill. March 19 to March 29. The course is designed for those working in the fields of design, production, procurement, management, quality control, inspection.

According to the University, intensive work will be given in the fields of control charts and acceptance sampling, with some attention paid to the rational setting of specifications and tolerances.

Inquiries should be directed to Professor John A. Henry, Mechanical Engineering Laboratory, University of Illinois, Urbana, Ill.

Reading Theme at Quebec

The Quebec Rubber & Plastics Group, meeting at the Queen's Hotel, Montreal, P.Q., Canada, October 20, heard A. J. Kirshner, professor, Sir George Williams College, discuss "Effective Reading as an Aid to Better Communication." Seventy-eight members and guests attended.

Dr. Kirshner declared that with most people the reading process involves the examination of a series of words in succession, each with equal intensity and emphasis. As a result, the reader is seldom able to see clearly the substance of what he is reading since it is competing with a greater mass of less important detail.

Dr. Kirshner advocated a preliminary rapid scanning of the text to be read, followed by a more careful perusal of the vital elements that would state the problem and present the solution. It is well known, he said, that the practice of reading every word is literally a waste of time since the bulk of what has been read is quickly forgotten.

At the business session of the meeting, the Group's steering committee revealed that it expected to expand its association with other organizations at monthly meetings. Planned for March was a joint meeting with the Society of Plastic Engineers.

Silicones Plentiful

United States producers of silicones will keep pace with the constantly increasing demand for these materials, according to T. J. Coleman, general manager, silicones department, Linde Air Products Co.

Sales of silicone rubber, especially, have been high, Mr. Coleman revealed. Industrial applications of silicones have included electrical insulation, mechanical rubber parts, as mold release agents, damping and hydraulic fluids, defoaming agents, molding compounds, and bonding agents.

Linde, a division of Union Carbide & Carbon Corp., is expected to start operations of its new $14,000,000 silicone plant at Long Reach, W. Va., in the near future. The chemical company executive said the 1,431 acres of land on which the new plant is located will provide adequate room for expansion when later demand for silicones warrant it.

Monsanto Film Previewed

A documentary motion picture on the plastics industry, produced for Monsanto Chemical Co., St. Louis, Mo., was previewed by representatives of press and industry at Toots Shor's Restaurant, New York, N. Y., November 9. Called "The World That Nature Forgot," the 30-minute, 16-mm. color film gives a broad, non-technical view of the industry while employing unusual photographic techniques and devices. Monsanto's second documentary on aspects of chemical industry, the film may be booked without charge through the film library of the firm's public relations department.

N. Y. Group Wilson and Pinto Retirement Party

B. B. Wilson

Peter P. Pinto

The special meeting of the New York Rubber Group held at the Henry Hudson Hotel, New York, N. Y., November 18 to honor B. B. Wilson, RUBBER WORLD, and Peter P. Pinto, *Rubber Age*, in connection with their retirement as officers of the Group at the end of 1955 was a most pleasant and successful affair. Messrs. Wilson and Pinto have served alternately as secretary-treasurer of the Group since 1936, and Mr. Pinto had served in the same capacity in 1932 and 1933.

The dinner was preceded by a cocktail party, courtesy of the Group. S. M. Martin, Jr., Thiokol Chemical Corp., 1955 chairman of the Group, presided at dinner, and he and several previous chairmen of the Group spoke on their associations with Britt Wilson and Pete Pinto during the period of their chairmanships. C. T. Jansen, *Rubber Age*, and R. Fairchild, RUBBER WORLD, discussed their respective bosses by virtue of their positions as advertising managers of the two publications.

John P. Coe, who recently retired as chairman of the board of Texas-U.S. Chemicals, Inc., spoke of the organization and early days of the Group. K. Soule, Manhattan Rubber Division, Raybestos-Manhattan, Inc.; J. Ingmanson, Whitney-Blake Co.; and G. Wyrough, Wyrough & Loser, related some of their experiences in working with the retiring secretary-treasurers and paid tribute to them for the very great help they had received.

M. E. Lerner, *Rubber Age*, read tele-telegrams and letters from other past chairmen and associates of the two men in which further expressions of appreciation and best wishes were found. Mr. Lerner then presented both Britt Wilson and Pete Pinto with the latest model Polaroid camera, complete with carrying case and accessories, as tokens of appreciation from the Group. The evening was concluded with three fine variety acts.

Co-chairmen for this affair were Mr. Lerner and R. G. Seaman, RUBBER WORLD. Other members of the arrangements committee were J. Breckley, Titanium Pigments Corp.; J. S. Corrigall, R. T. Vanderbilt Co.; M. R. Buffington, consultant; and G. N. Vacca, Bell Labs.

Conn. "Salesmen's Night"

The Connecticut Rubber Group held its annual fall meeting at the Actor's Colony Inn, Seymour, Conn., November 17, attended by 130 members and guests. The evening was designated "Salesmen's Night" to honor the many salesmen supporting the group. Featured speaker at the dinner was Jules Bues, baseball expert, who presented a talk and film on Babe Ruth.

The Group's nominating committee proposed its slate of officers for 1956. They are: Harry Gordon, Bond Rubber Corp., and Joseph Zeller, Armstrong-Norwalk Rubber Corp., vice chairman; John A. Brazee, Whitney Blake Co., and W. R. Bull, The B. F. Goodrich Co., secretary; R. T. Zimmerman, R. T. Vanderbilt Co., and Sidney Rothenberg, General Electric Co., treasurer; and Robert Van Patten-Steiger, Harwick Standard Chemical Co., Warren Carter, Pequanoc Rubber Co., K. F. Gerold, Dow Corning Corp., and G. B. Jerolman, Armstrong Rubber Co., directors.

Goodrich L. A. Expands

The Los Angeles, Calif., tire manufacturing plant of The B. F. Goodrich Co., Akron, O., will undergo a $6,000,000 expansion program to boost its tire output 50%, E. F. Tomlinson, vice president of the company's tire and equipment division, announced last month.

According to the tire executive, a large portion of the total expenditure will cover two new factory buildings, a new tire building, and additional curing equipment. Completion is expected by mid-1956.

A 1953 expansion of the plant cost $2,000,000.

NEWS of the MONTH

Washington Report and National News Summary

. . . . A complete reevaluation of military and civilian needs of natural rubber will not be available for about a year, and even then the Stockpile Act requires that very specific conditions be met before any reduction in the strategic natural rubber stockpile could be made. Arthur S. Flemming, Director of the Office of Defense Mobilization, emphasized at the annual meeting of The Rubber Manufacturers Association, Inc., November 16.

. . . . The Special Commission on Rubber Research of the National Science Foundation will make its report to the NSF board of directors on December 5 on the future of government-supported basic rubber research and the disposal of the Government Laboratory in Akron.

. . . . The President's April, 1956, report on rubber, as required by the Disposal Act of 1953, will use information from the NSF report and information on rubber resources and requirements being compiled by the Commerce and Interior departments.

. . . . Exports of GR-S type synthetic rubber during the first nine months of 1955 were three times those of any full calendar year since 1946. Exports of other types of synthetic rubber are also three times those of 1954 for the first nine months.

. . . . Higher bids have been asked for the Institute, W. Va., GR-S copolymer plant by the Disposal Commission at the halfway point in the negotiations period.

. . . . An RMA panel on stabilizing rubber costs stressed the importance of the planned expansions in synthetic rubber capacity in steadying prices for the industry's main raw materials during the next five years.

Washington Report

By ARTHUR J. KRAFT

Natural Stockpile Reevaluation Months Away; Revision of Objective Problematical

It may take another year for the government to come up with the type of detailed picture it needs before deciding whether to reduce its current defense stockpile of natural rubber. That the decision may be so far off into the future was indicated in remarks at the Rubber Manufacturers Association annual meeting in New York, November 16, by Defense Mobilizer Arthur Flemming and subsequently confirmed by an agency spokesman in Washington.

Here's a rundown of what's going on, with an approximate timetable, in the stockpile review situation:

Present Stockpile a 1950 Estimate

The present defense stockpile objective, something on the order of 1.2 million long tons, has been completed. It was attained over a year ago. Since then, the only rubber stockpile activity has been rotation, to prevent physical deterioration of stocks held by the government. This has been combined with a gradual upgrading to produce a higher ratio of high-quality grades, but with no change in the total quantity of rubber in the stockpile.

The present stockpile objective is based on a projection of military requirements for a five-year war which was drawn up five years ago. This projection was made in 1950 by the Rubber Division of the National Production Authority. It was based on then-current estimates of wartime needs of some 1,000 military hard goods items, such as tanks, planes, etc. When the projection was broken down into components for these end-items, the NPA division calculated the rubber needed to make the components. Similar calculations of the needs of other raw materials were made by other divisions of NPA and related mobilization agencies.

New 1953 Estimate Soon

The procedure is now being repeated for rubber, this time by the Office of Defense Mobilization—Flemming's agency—and based on revised concepts of military strategy, up-dated to December, 1953. At that time the Army, Air Force and Navy developed their separate wartime strategic plans to give ODM a new set of figures for wartime needs of the many military hardware items. ODM hopes to have these translated into rubber requirements figures within a few months. It will then get an opinion from the Defense Department as to whether more recent revisions in strategic concepts are great enough to bring the rubber requirements figures—as based on 1953's military plans—into serious question.

This will give ODM a rough basis for gaging the adequacy of the current stockpile—a sound enough picture to use in making some general forecasts of rubber requirements and supply for the next few years. The main purpose of having such a picture is the report, due under the Synthetic Rubber Plant Disposal Law of 1953, from the President to Congress next spring. The report is to deal with overall demand

and supply, chiefly for the civilian economy, as well as the need of continuing government-assisted basic rubber research.

Further Revision Required

This report will not, however, afford the precise picture needed as a basis for stockpile revision action. The main reason is that the military services since 1953 have changed their method of developing strategic plans for wartime. This change was made only a few months ago, when the Joint Chiefs discarded the old system of each military arm drafting such plans unilaterally.

Instead, wartime strategic planning is now done by the Joint Chiefs on a combined basis for all three services. Currently, ODM is receiving data from the Defense Department for the various military hardware items required by the military establishment as a whole. As they come in, these estimates are broken down into component parts. It will be many months before ODM completes this job and can translate these up-to-date hardware estimates into a wartime requirements figure for natural rubber.

Once this is done, ODM will know whether the present stockpile objective is too high, too low or right on the nose. If it shows up as higher than required by current strategic concepts, there is still no assurance that ODM will recommend reducing the stockpile.

In the first place, even the most carefully thought-out forecasts of how a future war will be fought and what it will require in materiel can turn out to be wrong. Defense officials can't be sure that advance prognostications of materiel needs will be right on the button. A little extra margin in the stockpile, if that's what the revised estimates show, would be regarded in the Pentagon as a healthy situation, allowing for possible error in the strategic concepts. A 10 or 15% stockpile "surplus" probably would not dictate a recommendation by ODM to sell off rubber. A greater surplus over the revised stockpile objective, on the other hand, might bring a proposal to reduce government stocks, at least to a level leaving a more reasonable margin of safety.

Regardless of the statistical picture that emerges from the refined stockpile calculations due next year, there's another big factor to consider. That is the impact of any stockpile reduction program undertaken here on the economic and political stability elsewhere in the free world. This imposes a big "if" for anyone trying to forecast that a reduced stockpile objective will bring a sale of government rubber stocks.

Malaya, Indonesia, and other natural rubber growing areas, if past attitudes are a sound guide, would vigorously protest a stockpile cut. From the present temper of the Congress and the Administration, such protests probably would carry the day.

No Rubber Diversion Possible

Dr. Flemming's talk to the RMA contained some strong words about diverting materials from the stockpile to civilian channels. His opinions, however valid they may be, have no direct bearing on the rubber stockpile reduction.

Arthur Flemming, ODM Director and RMA Meeting Speaker

The ODM chief was speaking of diversions of materials produced under contract to ODM—such as aluminum and copper. Contracts, authorized by the Defense Production Act, for these materials give the stockpile first call on deliveries. Often, when a tight supply situation prevails in the civilian market, ODM passes up its call for all or part of a scheduled delivery. Flemming made a strong case against diverting such materials to civilian channels after the ODM had called for their delivery to the stockpile.

There are no such contracts for rubber. Moreover, the rubber stockpile target has already been met; so there are not likely to be any such contracts in the future.

This speaker's strong words against stockpile "diversion" can best be appreciated when viewed against the political backdrop. Singapore newspapers, a day or two before Flemming was to address the RMA, carried blazing headlines of a major declaration on U. S. stockpile policy. Beneath the big type the papers noted with some concern that Dr. Flemming had been corresponding with Chairman John Collyer, of B. F. Goodrich, who had publicly urged a sharp stockpile reduction on the ground that technological advances since 1950 had produced improved synthetics able to do some of the jobs that only natural rubber could do at that time.

Flemming, not wishing to set spark to the sensitive Singapore market, therefore came before the RMA with what, at first blush, looked like a firm declaration of policy against releasing rubber from the stockpile. But, what it amounted to was a reiteration of U. S. policy that the stockpile should not be a plaything to accommodate the civilian economy. Congress, in the Stockpile Act, was very specific in the conditions that must be met before any stockpile material can be sold—and all of those conditions are tied to defense needs.

December for NSF Rubber Research Commission Report; President's Rubber Report in April

The 11-member Special Commission on basic rubber research held its third, and perhaps last, meeting here, November 15, to discuss the recommendations it would make to the National Science Foundation on the two issues before it. These are whether NSF should continue support for basic research in synthetic rubber, and whether the government should dispose of its $2 million rubber laboratory and pilot plant in Akron. Congress has asked the President's views on both questions.

Report to NSF Directors December 5

The Special Commission, composed of six scientists and five non-scientists, named a drafting committee at the November 15 session to meet in New York the week following to put the Commission's recommendations into writing. This rough draft will then be circulated among all Commission members. The final document, which should be completed by November 30, barring possible, but unexpected, strong dissents, will be laid before NSF's board of directors at their December 5 meeting. The Special Commission's report, according to present plans, will be made generally available to the public shortly thereafter.

The NSF directors will take some position on these proposals, but what their position will be may not be known for some months. This policy is due to the fact that the two issues before NSF are to be covered in a report by the President to Congress, due April 29—but likely to be completed a month or so earlier—on the nation's rubber resources and requirements and the future need of federally supported basic research. This report is required under Sec. 10 of the Rubber Disposal Act of 1953.

NSF Report Related to President's Report

NSF is one of six agencies currently at work as an ad hoc committee to pull together a report for the President, which he, in turn, can pass on to Congress. The other participating agencies are the Commerce, Defense, Interior, and Treasury departments and the Office of Defense Mobilization. The ODM representative is chairman of the group.

At its early meetings it was agreed that the report would consist of two main sections—one dealing with rubber resources and requirements, and the second with research and the Akron Lab disposal question. The Commerce and Interior department representatives are carrying the initial work on the first part. NSF is doing the same on the second.

All six agencies will have a crack at all matters covered in the report before it reaches the President. The White House, of course, can alter any portion of the report before sending it along to Congress. Only the version that leaves the White House will represent official Administra-

tion views. No one expects any big controversies at any point along the route.

The ad hoc committee's work has hardly been under way long enough to provide anything more than a rough outline of the course it intends to take—that is, the likely form, rather than the substance, of its report. The first part, dealing with resources and requirements, is expected to include projections of rubber supply and demand for each year to 1960. It may also say something about the rubber supply situation the nation and its allies will face in event of a national (or international) emergency.

The second part of the report, covering the ground which NSF's Special Commission is to report on this month, may be divided into three main headings—(1) recommendations dealing with the existing basic rubber research program; (2) what direction should federally supported future rubber research programs take; and (3) what disposition, if any, should be made of the Akron Lab.

NSF Government Lab Survey Contracts

The NSF Special Commission had some encouraging news to report on the latter question. It will be recalled that several months ago NSF authorized the Lab manager (the University of Akron) to seek out as many commerical research contracts as it could. The purpose was to gage the prospects of the Lab becoming a commercial success should the government cease underwriting its operating budget and feeding it projects to keep it busy. More recently, the Special Commission, encouraged by the reception to the Lab's efforts to drum up private business, sent out a mail questionnaire to 138 rubber and chemical companies which it considered as potential customers or future operators of the Lab. At the November 15 meeting the Commission had 79 replies. Of these, 45 expressed no interest. The remaining 34—a substantial number by any count—indicated some interest either in contracting for research work at the Lab or in acquiring the Lab through purchase or lease. This survey will give the Commission at least a rough idea of the commercial attractiveness of the Lab.

The University of Akron announced November 9 that it had succeeded in signing three contractors for work which will bring in $300,000 in the current fiscal year. These were Shell Chemical Co., Hercules Powder Co., and Esso Research & Engineering Co. It was also announced that the Shell contract will involve research on synthetic rubber manufacturing processes, to be coordinated with work going on at Shell's research facilities at Torrance and Emeryville, in California. The Hercules contract covers work involved in application of that firm's goods.

The University authorities also announced that they were in various stages of negotiation with a score of other rubber and chemical companies and expected to have more contracts signed up very shortly. Its announcement termed the response to its efforts "most gratifying." The University has long sought to take over ownership of the Lab—lock, stock, and barrel. Having demonstrated an ability to handle the business end of the Lab activities, the University's chances are better than ever before.

Special Note. The University of Akron itself has an additional contract for $50,000 a year for research concerned with fundamental investigations of polymerization mechanisms and systems with the aim of relating the physical properties of the synthetic elastomers with their chemical constitution. This contract is for work being conducted at the University's Knight Laboratory. In our report of NSF contracts on page 90 of our October, 1955, issue we reported only the $50,000 a year management fee contract for operating the Government Laboratories. We extend our thanks to Dr. Maurice Morton, director of rubber research, University of Akron for pointing out this omission. EDITOR.

Synthetic Rubber Exports Rising

Exports of American produced GR-S type synthetic rubber during the first nine months of this year more than tripled those of any full calendar year since 1946. Through September, exports amounted to 37,726 long tons, more than 80% of which has been shipped since late spring, when the government rubber plants were transferred to private ownership. September alone saw 8,598 tons of GR-S exported. This figure exceeds the 8,129 tons exported during the entire nine-month period, January through September, 1954.

The Commerce Department, which gathers and publishes export figures, reported September exports of all types of synthetic rubber at 11,672 tons, with a value of $7,551,870. The August figures were put at 10,397 tons and $6,746,774. The September total was the highest since the early months following V-J Day when the U. S. Government shipped synthetics abroad to relieve the plight of foreign firms trying to reestablish manufacturing operations, but lacking enough natural rubber to do so.

Exports of other types of synthetic rubber, besides GR-S, have been on the rise this year. During the first nine months, exports of all synthetics totaled 60,447 tons, valued at $39,821,986. For the same period of last year they were 21,516 tons, at $17,471,635. GR-S exports totaled 6,681 tons through April, 1955. The synthetic producing facilities—making GR-S and butyl types—commenced their first full month under private operation on May 1.

Here's a summary of the export figures by principal types, as reported by the Business & Defense Services Administration, Department of Commerce (all figures in long tons):

	Sept., 1955	Jan.-Sept. 1955	Jan.-Sept. 1954
GR-S type	8,598	37,726	8,129
Butyl	526	6,654	1,928
Neoprene	1,946	12,665	8,591
Nitrile	602	3,402	2,868

Will this accelerating trend continue? Most experts' answer will be an unqualified "yes." But some see an interruption, perhaps even a sharp cut-back, if rubber remains in tight supply—or becomes even tighter than today, in the early months of next year. With new synthetic rubber facility expansions coming in next spring, they foresee a revival of the sharp upward trend in GR-S exports to unprecedented heights. They believe this will start once the winter season is out of the way.

Justice Department Appeals Tire Discount Ruling

Two of the government's top legal officers made clear last month that they'll put up a fight for the Federal Trade Commission's tire quantity limit rule. The ruling, designed to curb the discounts granted by manufacturers of replacement tires and tubes, was declared invalid September 7 by Federal District Judge Alexander Holtzoff.

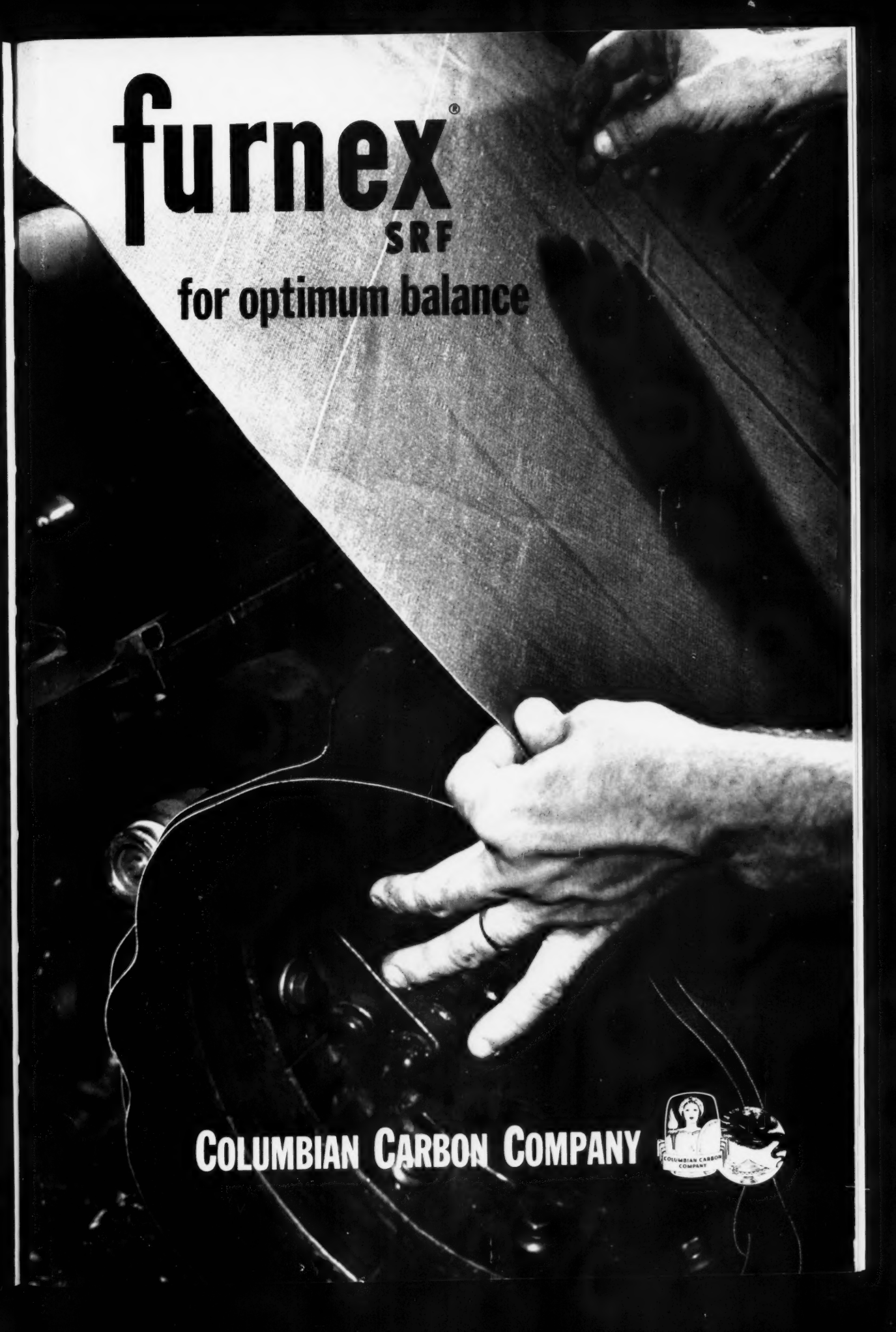
On November 2—within the 60-day limit for such action—Solicitor General Simon E. Sobeloff, on behalf of FTC, filed notice that the Justice Department will appeal the Holtzoff decision to the Court of Appeals in the District of Columbia. It was that Appelate Court which two years refused to go along with a lower court order putting the quantity rule into effect and instead ordered the case to trial in the District Court.

The Justice Department has 60 days from November 2 to file formal appeal papers in the Court of Appeals, setting forth the arguments it will use in its effort to have the Holtzoff decision reversed. The tire limit order, originally set by FTC to take effect in April, 1952, has never been formally invoked. From the original effective date until Judge Holtzoff quashed it, the rule had been suspended through a series of temporary injunctions issued by the courts pending a decision on the merits of the issue. Battling the rule from the start have been all tire manufacturing firms and several petroleum firms and tire distributors.

Mr. Sobeloff, Number 2 man in the Justice Department, agreed to appeal the Holtzoff decision at the request of FTC. On November 15 the new FTC chairman, former Republican Congressman John W. Gwynn, testified before the House Small Business Committee that he intends "to make a fight" for the tire rule.

"As far as I'm concerned," Mr. Gwynn declared, "when anything is written into the law it's there to be enforced. The quantity limit case presents some interesting questions. I'd like to see the court rule on them at the earliest possible moment."

That "anything written into the law" in this instance is the quantity limit proviso of the Robinson-Patman act, which permits FTC, after making appropriate findings of fact, to set limits on discounts, even if those discounts are justified by cost savings to the seller which result from filling a large order. The appropriate find-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STATEX-M FEF
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ings required are that so few buyers can qualify for the larger discounts so as to make these discounts unduly discriminatory against the great number of smaller volume buyers.

Judge Holtzoff struck down the tire ruling—the first and so far only quantity rule issued since this proviso was enacted in 1936—because he felt FTC had failed to make a proper finding to support it. He imputed this failure to a technical deficiency. The Holtzoff ruling never got into the more basic questions of constitutionality raised by the industry's briefs.

Synthetic Rubber Competition Report Due

The Senate Banking & Currency Committee has queried the Justice Department as to its plans for reporting to Congress on the competitive situation in the synthetic rubber industry. Such a report was requested when Congress approved sale of 25 synthetic rubber plants to private industry. The Attorney General was asked to furnish the report a year from the date of transfer, or May 1, 1956.

In a reply to Chairman J. W. Fulbright (Dem., Ark.), Assistant Attorney General Stanley N. Barnes said his anti-trust division intends to conduct such a survey of the industry and submit a report to Congress. The Department, he said, is still considering when to launch its study.

There's a strong possibility that Mr. Barnes may seek an extension of the deadline so that he may include a period in which both the Baytown and Institute GR-S plants are operating under private owners. Baytown was sold to United Rubber & Chemical—an independent without rubber fabricating interests—only this summer. Institute, assuming it is sold, will not be in private hands until February or March and probably won't be selling rubber until April or May, 1956.

All indications point to Mr. Barnes' desire to make a serious and thorough job of the survey. Those familiar with the work this entails estimate it will take five months or more from start to finish. That could mean a report to Congress early in 1957, rather than some time in 1956.

The Banking Committee has also gone on record (in the majority report approving the 25 contracts) with a request for a similar report by the Justice Department at annual intervals for the duration of the 10-year national security clause. Each contract of sale included a clause requiring upkeep of the plant for a 10-year period and empowering the government to recapture the plant on short notice any time within that period.

Disposal Commission Asks Higher Institute Plant Bids

The Rubber Producing Facilities Disposal Commission, facing a December 21 deadline for contracting the sale of the Institute, W. Va., copolymer (GR-S) plant, called for an upward revision of bids last month from the six parties vying for the plant. The bidders were asked to turn in new price figures by November 21, halfway point in the negotiations period.

With official announcements lacking since the bids were received in October, those who hoped to learn how the negotiations are proceeding had only rumor to feed on. A few choice morsels:

Competition among the bidders is hot. The Commission may yet pull a bid in the $5 to $10 million range. Union Carbide & Carbon, some suggest, looks like the company willing to go highest. There is talk of a post-disposal deal whereby a large rubber company will contract for a major portion of Institute's output—with Union Carbide the owner-operator of the plant.

There's even been some talk of a deal that will see the plant moved, lock, stock, and barrel, to Louisiana, which already has a hefty chunk of the nation's production of rubber and its chief raw material, butadiene. It is hard to envision West Virginia's Congressional delegation—always very much alive to their constituents' stake in the big rubber plant—showing much enthusiasm for exporting the plant should that be in the cards when the sale comes up for approval by Congress in January.

As for the butadiene situation, there are a half dozen or so projects in the works for expanding production of this key material for GR-S type rubber. ODM is expected at this writing soon to announce that the government, once again, will permit rapid tax writeoffs for new butadiene capacity.

Meanwhile, with supplies remaining tight and rumors of a big (up to 20%) price boost for crude petroleum produced in the mid-continent area due about January 1, producers of GR-S are carefully weighing the switch in formula successfully undertaken across the border at the Canadian Government's Sarnia plant. There the styrene content was increased about 5% to permit an equivalent reduction in butadiene.

National News

Synthetic Must Meet Growing World Rubber Demand, RMA Conclave Hears; Stockpile Stays: Flemming

The burden of meeting the world's growing demand for rubber products will have to be borne largely by the synthetic rubber producing industry. This was the keynote of the fortieth annual meeting of The Rubber Manufacturers Association, Inc., at the Park Lane Hotel, New York, N. Y., November 16, attended by some 200 representatives of 70 of the nation's rubber manufacturers.

After an introductory address by RMA President Ross R. Ormsby, the meeting heard a five-member panel of rubber industry experts discuss "Stability Factors in Rubber Costs through 1960." Arthur S. Flemming, Director of the Office of Defense Mobilization, was principal speaker at the luncheon that followed.

The panel and the subjects of their remarks follow: Thomas Robins, Jr., president, Hewitt-Robins, Inc., "The Expanding Market for Rubber Products"; George Trenchard, manager, economics department, The Firestone Tire & Rubber Co., "Rubber Requirements, 1955 through 1960"; W. E. Cake, vice president, United States Rubber Co., "Natural Rubber Supply, 1955 through 1960"; L. E. Spencer, assistant to the president, The Goodyear Tire & Rubber Co., "Synthetic Rubber Supply, 1955 through 1960"; and J. W. Keener, vice president, The B. F. Goodrich Co., "Distribution and Use of Synthetic Rubber in World Markets." (Addresses of the panelists are printed in full starting on page 375.)

Ormsby Forecasts

Mr. Ormsby stated that while world rubber consumption is expected to rise approximately 20% over the next five years, all signs point to a substantially more rapid rise in world capacity for production of the industry's basic raw materials.

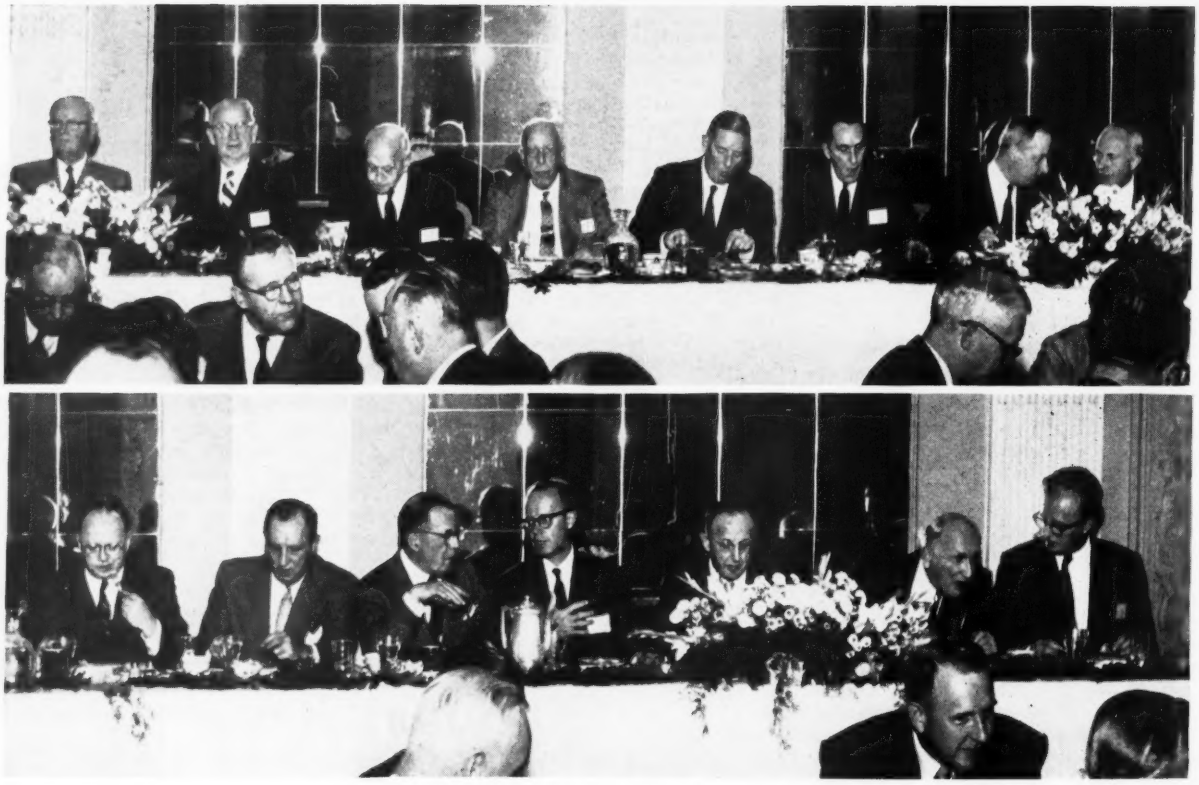
"Announced expansions of synthetic rubber producing capacity and pending announcements of further expansions here and throughout the world, when added to the relatively stable output of natural rubber, should provide a supply of new rubber in excess of projected demand for each of the next five years," he stated.

The RMA head expected that U. S. production of general-purpose synthetic rubber would reach annual level of 1,100,000 long tons by the end of 1956. By that time "our consumption of man-made rubber could approach two-thirds of our total new rubber requirements," the highest such ratio in the industry's history, he said.

Mr. Ormsby also applauded the end of the government's 12-year monopoly in synthetic rubber. The sale of the copolymer plants to private hands returned upward of $415,000,000 to the Federal Treasury, he declared.

Flemming Says No Stockpile Cut

Dr. Flemming, discussing the nation's defense mobilization program, conceded that the government's huge natural rubber



Head table at luncheon at the fortieth annual meeting of the RMA, Park Lane Hotel, New York, November 16, (top row) left to right: E. A. Callanan, president, Brown Rubber Co.; Gordon Smith, executive vice president, United States Rubber Co.; A. L. Viles, general consultant, RMA; P. W. Litchfield, chairman of board, Goodyear Tire & Rubber Co.; Thomas Robins, Jr., president, Hewitt-Robins, Inc.; W. S. Richardson, president, The B. F. Goodrich Co.; Arthur S. Flemming, Director, Office of Defense Mobilization; Ross R. Ormsby, president, RMA; (bottom row) P. Seiberling, president, Seiberling Rubber Co.; Lee R. Jackson, president, Firestone Tire & Rubber Co.; A. A. Garthwaite, president, Lee Rubber & Tire Corp.; H. E. Humphrey, Jr., president, U. S. Rubber; A. L. Freedlander, president, Dayton Rubber Co.; William O'Neil, president, The General Tire & Rubber Co.; and O. G. Vinnedge, vice president and general manager, Dryden Rubber Division, Sheller Mfg. Corp.

stockpile was being reviewed, but he thought that stockpiling policies could not be changed for at least another year. American rubber leaders have been largely in favor of reduction in the size of the rubber stockpile.

The ODM Administrator listed four basic assumptions under which his office operates: that we are living in an age of permanent emergency, that Soviet Russia's capability of attack on the United States will increase with time, that we must deal with the forces of international Communism from a position of strength, and that we must be prepared for general mobilization with or without an attack on the United States.

For these reasons, he said, "we are constantly working on this problem of developing a supply requirement balance sheet that will enable us to identify the gaps in our mobilization base." This process has been helped by a list of a thousand major military end-items which the Department of Defense provided the ODM in 1953, he added.

Speaking specifically of rubber, Dr. Flemming told his audience that since the three military services are now developing new requirements for major end-items based on a new joint strategic plan, "about a year from now, it will be necessary for us to review the situation again in the light of the requirements that will come to us as a result of the work that goes on in the Defense Department."

This speaker emphasized, however, that any review of a particular stockpile would only relate to the advisability of deferring new additions to the stockpile, not releasing materials already there.

He said that the Congressional law pertaining to stockpiling specifically states that no stockpiled material may be released except by order of the President for the purpose of common defense, or in time of war, or during a national emergency proclaimed by the President.

"May I say to you with all of the underlining that I can possibly supply, that no one in the executive branch should ever be given authority to release such materials when, in his judgment, it would be in the interests of the civilian economy to do so.

"If such authority were ever granted, it would mean that billions of dollars of materials would constantly be overhanging the market, subject to disposition on the basis of the decision of some individual in the executive branch to the effect that, in his judgment, it was a good thing to do from the standpoint of the interests of the civilian economy."

Flemming defended the maintenance of huge stockpiles because of the necessity of establishing long-term stockpile objectives. Such objectives, he said, are based on the total discounting of foreign sources, except Canada, Mexico, and the Carribean countries.

Sears' Summary

Summing up the addresses of the five panelists, W. J. Sears, RMA vice president and panel moderator, said that the speakers had pointed the way to greater stability in rubber costs through the development of a better balance in worldwide consumption of synthetic rubber.

He stated that this balance can be achieved by a substantial increase in synthetic rubber production, by the combined efforts of all American companies to use the maximum amounts of synthetic rubber, and by the supplying of all foreign rubber manufacturers with ample quantities of low-cost American rubber.

"When this program is fully effective, the rubber consuming industry should no

longer be subject to dizzy rides on the natural rubber price roller coaster," he said. "The serenity of the carousel is more to our liking."

Wechsler New RMA Director

During the organizational meeting of the RMA, which concluded the day's activities, Albert H. Wechsler, vice president and general manager of Converse Rubber Co., Malden, Mass., was elected to the RMA's board of directors. He will fill until 1957 the unexpired term of Hugh Bullock, Tyer Rubber Co., who retired in September.

Five other directors were reelected for three-year terms. They are A. L. Freedlander, The Dayton Rubber Co.; O. G. Vinnedge, Dryden Rubber Division; William O'Neil, The General Tire & Rubber Co.; W. S. Richardson, The B. F. Goodrich Co.; and P. W. Litchfield, The Goodyear Tire & Rubber Co.

Also reelected as officers of the association were R. R. Ormsby, president; W. J. Sears, vice president; George Flint, secretary; and C. W. Halligan, treasurer.

Tire Prices Increased Again

The Goodyear Tire & Rubber Co. increased prices on its tires and tubes, tread stock, and repair materials from 1½ to 7½% on October 24. Passenger-car tires prices were raised 1½%, and truck tires 5%, inner tubes 3½%, and recapping material 7½%. No price increases for its tubeless tires, however, were made.

These price increases were necessitated by higher costs of materials and labor, the company explained. Tubeless tire prices were not raised because the average price increase on tubeless tires of August was considerably more than was applied to tires with inner tubes.

Similar price increases were announced by The B. F. Goodrich Co., General Tire & Rubber Co., Dayton Rubber Co., United States Rubber Co., and Armstrong Rubber Co., in late October and early November. Goodrich also upped the price of its premium-quality tubeless tire 1½%.

U. S. Rubber Costs Up

At present consumption rates, crude natural rubber is costing this country almost $225,000,000 more per year than last year at about this time, Frank T. Tucker, assistant to the president, the B. F. Goodrich Co., Akron, O., told a recent meeting of the Advertising Club of Akron.

Based on the quantities now being consumed in the United States, an increase of only 1¢ a pound in the price of crude rubber increases the nation's rubber costs $13,500,000, Mr. Tucker said. He observed that foreign crude rubber can be produced at a lower cost than American-made rubber; yet its price increased from 26¢ a pound slightly over a year ago to almost 50¢ a pound in September.

Expressing his faith in advertising, the rubber executive said that advertising research has taken much of the blind faith, the guess work, the pipe dream, the hunch, the gamble, and millions of dollars of waste out of advertising.

Record Synthetic Production in October; RMA Monthly Rubber Statistics More Extensive

RMA Preliminary Industry Rubber Report

October, 1955—(Long Tons)

Natural Rubber

Dry Natural Rubber	Imports	New Supply Reexport	Net	Consumption	Stocks End of Month
September, actual	42,350	858	41,492	43,603	101,210
9 months, actual	418,508	7,149	411,359	412,446	
October, estimated	40,697	700	39,997	47,433	102,107
10 months, estimated	459,205	7,849	451,356	459,879	
Liquid Latex Solids					
September, actual	8,109	—	8,109	7,572	12,649
October, estimated	7,225	200	7,025	6,976	11,974
10 months, estimated	79,630	200	79,430	70,691	
Total Natural Rubber					
September, actual	50,459	858	49,601	51,175	113,859
9 months, actual	490,913	7,149	483,764	476,071	
October, estimated	47,922	900	47,022	54,409	114,081
10 months, estimated	538,835	8,049	530,786	530,480	

Synthetic Rubber, Including Latex

RS types	Production	New Supply Imports	Exports	Net	Consumption	Total Stocks
September, actual	67,658	588	6,469	61,777	63,450	112,838
9 months, actual	569,258	8,000	35,619	541,639	540,888	
October, estimated	72,480	737	6,100	67,117	67,493	112,462
10 months, estimated	641,738	8,737	41,719	608,756	608,381	
Neoprene						
September, actual	7,677	—	1,365	6,312	6,225	11,019
9 months, actual	66,247	—	12,083	54,164	52,891	
October, estimated	6,848	—	1,250	5,598	6,592	10,025
10 months, estimated	73,095	—	13,333	59,762	59,483	
Butyl						
September, actual	5,030	67	854	4,243	4,547	12,233
9 months, actual	40,322	711	6,983	34,050	39,857	
October, estimated	5,458	43	1,200	4,301	4,689	11,845
10 months, estimated	45,780	754	8,183	38,351	44,546	
N-Types						
September, actual	3,142	—	429	2,713	3,031	5,207
9 months, actual	25,558	—	3,228	22,330	21,411	
October, estimated	3,327	—	450	2,877	3,129	4,955
10 months, estimated	28,835	—	3,678	25,207	24,540	
Total Synthetic						
September, actual	83,507	655	9,117	75,045	77,253	141,297
9 months, actual	701,385	8,711	57,913	652,183	655,047	
October, estimated	88,113	780	9,000	79,893	81,903	139,287
10 months, estimated	789,498	9,491	66,913	732,076	736,950	

Summary

	Production	New Supply Imports	Exports	Net	Consumption	Total Stocks End of Month
Total Natural and Synthetic Rubber						
September, actual					128,428	255,156
9 months, actual					1,131,118	
October, estimated					136,312	253,368
10 months, estimated					1,267,430	
Reclaimed Rubber						
September, actual	26,377	60	1,169	25,277	26,444	27,056
9 months, actual	240,752	555	9,966	231,341	236,544	
October, estimated	27,810	50	1,150	26,710	26,717	27,049
10 months, estimated	268,562	605	11,116	258,051	263,261	
Scrap Rubber						
October, estimated					22,408	86,263
10 months, estimated					238,956	

The Rubber Manufacturers Association, Inc., in a release dated November 22 reported that a new all-time record-high production of synthetic rubber was established in the United States during October, reaching 88,113 long tons, compared with the 83,507 long tons produced in September.

Natural rubber consumption amounted to 54,409 long tons, compared with 51,175 long tons consumed a month ago. New rubber consumption in the United

States in October totaled 136,312 long tons, the second highest consumption month in history, exceeded only by the month of June, 1955, when 136,464 long tons were consumed.

The RMA announced that with the November release, the Association is now publishing full statistics showing imports of natural rubber and production of synthetic rubbers, imports, exports, and stocks for each individual type of rubber in addition to consumption figures previously announced monthly.

A comparison of export figures for synthetic rubbers, particularly GR-S type, between the figures given in the RMA tables above and those for September in the story in the *Washington Report* on synthetic rubber exports, will reveal discrepancies varying between 2,100 long tons for GR-S type exports for September and 2,534 long tons for all synthetic rubber exported during the first nine months of 1955. The Commerce Department, from which the higher figures were obtained, explains that the higher September figures and the higher all synthetic export figures result for the fact that the lower figures, as prepared by the Commerce Department, are pure estimates, and the higher figures actual export declarations.

IRSG Rubber Statistics

The detailed statistics on rubber production and consumption released by the International Rubber Study Group following its meeting in Liberia during the week of October 14 were not available for our November issue, but are presented herewith. It will be noted that the 35,000 long-ton surplus of production over consumption is composed of synthetic rubber entirely since an actual deficiency of 10,000 long tons is attributed to natural rubber in 1955.

IRSG Estimated Natural Rubber Production for 1955

(In 1,000 Long Tons)

Territory	Output
Indonesia	700
Malaya	630
Thailand	120
Ceylon	92.5
Viet-Nam	65
British Borneo	59
Liberia	37
Belgian Africa	26
British Africa	26
Cambodia	25
Burma	12
French Africa	3.5
Papua	3.5
Other countries	50.5
Total	1,850

IRSG Estimated Synthetic Rubber Production in 1955

(In 1,000 Long Tons)

Territory	Output
U.S.A.*	955
Canada*	100
Germany	10
Total	1,065

* Including oil-content of oil-extended rubbers.

IRSG Estimated Natural and Synthetic Rubber Consumption for 1955

(In 1,000 Long Tons)

Territory	Natural	Synthetic	Total*
U.S.A.	620	865	1,485
United Kingdom	245	19	264
Federal Republic of Germany	142	26	168
France	126	25	151
Japan	89	4	93
Canada	40	40	80
Italy	57	13	70
Australia	50	0.5	50.5
Belgium	21	2	23
Netherlands	21	1.5	22.5
Denmark	7	0.5	7.5
Other countries	442	23.5	465.5
Total	1,860	1,020	2,880

* Including oil-content of oil-extended rubbers and excluding synthetic rubber produced in the U.S.S.R. and the German Democratic Republic.

Other Industry News

New Rubber Goods Needed, H. N. Hawkes Tells IMA

The continued growth of the rubber industry depends upon the development of new products and techniques, Howard N. Hawkes, vice president and general manager, tire division, of United States Rubber Co., New York, N. Y., told a meeting of the Indiana Manufacturers Association at Indianapolis, Ind., October 25.

Speaking on "Our Fabulous Fifties," Mr. Hawkes pointed to this mid-century decade as being a milestone in industrial progress, but warned that still greater productivity in men and machines is needed to meet an ever-growing consumer demand for new goods and services.

Citing one example of such increased productivity, he said that tire plants had recently been changing over to a new type of curing process which does three operations in one. A second example was a new technique, introduced this year, for the manufacture of molded rubber parts in continuous lengths for hose, mountings, door seals, and similar items.

Of the new tire products introduced by his own company during the past year, he mentioned the following:

A new tractor tire with 50% more wear and far greater pulling power than its predecessor.

A solid rubber tire for coal mine cars that permits them to carry greater loads at faster speeds.

A special tractor tire designed to tread soft soil rather than digging into it.

A new passenger-car tire with greatly improved skid resistance and traction that actually gets better as the tire ages.

A passenger-car tire designed specifically for high-speed performance and safety without sacrificing comfort at normal highway speeds.

A tire made of silicone rubber which will stand up under temperatures from —90 to 600° F.

Mr. Hawkes cited one estimate that by 1965 United States' gross national product can increase to $535 billion a year. But a labor force of more than 90 million would be required for such a task, he said, and that would be 12 million more people than would be available in the year 1965.

To reach this production figure, therefore, "It will take added capital investment and expanded research of the most advanced type," he said. "And it will take many new products and improved products which the American consumer will need and want to live a better life."

Barrett Promotes Three

Maurice H. Bigelow has been named to the newly created position of director of research in the research and development department of Barrett Division, Allied Chemical & Dye Corp., New York, N. Y., it has been announced by C. G. Stupp, vice president. Formerly director of the Glendale Plaskon Laboratory, Toledo, O., Dr. Bigelow will be stationed at Barrett's Glenolden, Pa., laboratory, which he will head.

Also advanced were David E. Cordier, formerly supervisor of research at the Glendale Laboratory, to director there, and James B. Maguire, formerly director of the Glenolden Laboratory, to director of development for the department.

Mr. Cordier has been with the Plaskon Laboratory for 22 years, having started with the original company, Toledo Synthetic Products, as a research chemist. Mr. Maguire, who will manage engineering development, process design, and pilot plants, with headquarters in Philadelphia, Pa., has been associated with the Barrett Division for 21 years.

Ohio-Apex Plasticizer

Ohio-Apex Division of Food Machinery & Chemical Corp., Nitro, W. Va., has made commercially available di-isodecyl phthalate plasticizer. The material has been in experimental production for some time, Ohio-Apex says, but favorable test data and increased interest by consumers have now brought about full-scale production. Samples and technical data sheets may be obtained from the company on request.

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OIL EXTENDED POLYMERS GR-S TYPES 1705, 1709, 1710	**SUNDEX-53**	**Versatile.** Gives quicker, more thorough plasticization. Highly compatible with natural rubber and reclaims as well as with GR-S rubber types.
NEOPRENE WHV	**SUNDEX-53**	**Highly Extended,** Neoprene WHV compounds can be made for prices comparable with those of low-cost elastomers.
REGULAR NEOPRENES and NATURAL RUBBER	**CIRCO LIGHT RUBBER PROCESS-AID**	**Gives True Softening** by physical changes in rubber structure rather than chemical. Large quantities can be absorbed without blooming.

To learn more about using Sun Rubber Process Aids to get better physicals, lower costs, and easier processing, see your Sun representative. Or write for your copy of Sun's latest Technical Bulletin describing any of the above products. Address SUN OIL COMPANY, Philadelphia 3, Pa., Dept. RW-12.

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Erie R.R. Installs Goodyear Rubber-Steel Rail Crossing

New Goodyear rubber roadway at Erie R.R. West Salem, O., crossing

What is described as the world's first commercial application of a rubber highway-railroad crossing has been made on the main tracks of the Erie Railroad, across U. S. Highway 42 at West Salem, O., said to be one of the most heavily traveled railroad crossings in the whole United States.

According to The Goodyear Tire & Rubber Co., Akron, O., manufacturer of the rubber-and-steel crossing, the installation was made after a similar experimental one had performed successfully on another section of the Erie line, showing no apparent wear or deterioration after a year of tests.

The new rubber roadway consists of slabs of rubber with a seven-gage steel supporting member embedded in the rubber, secured by bolts through railroad tie shims to regular road-bed ties. The slabs have a deep diamond-shaped tread for skid resistance and are provided with tapered flanges to make a watertight seal with the rails.

The rubber is said to be of a special long-wearing composition for resistance against weather and traffic abrasion. The roadway has good shock-absorbing qualities and is flexible enough to break up ice formations, the company says, and may be easily removed for purposes of replacement.

The roadway, by enabling passenger cars and trucks to cross the tracks smoothly, will also build improved public relations for the railroad, R. B. Warren, manager of the industrial products department for Goodyear, said finally.

$200,000,000 Foam Market

The foam rubber market is moving toward a $200,000,000 annual sales volume, A. L. Freedlander, president of Dayton Rubber Co., Dayton, O., told a meeting of 100 business executives of the Waynesville, N. C., area, October 25.

In describing the recent enormous gains of the foam rubber industry, Mr. Freedlander estimated that 1955 latex consumption for the manufacture of foam would total 228,000,000 pounds, 25% higher than in 1954 and far in excess of the 25,000,000 pounds consumed eight years ago.

He also indicated that his company was expanding its Waynesville plant with such forthcoming additions as a new shipping and warehouse building, a foam rubber building annex, and the installation of new boilers and new heavy equipment, such as compressors and dryers.

The rubber executive predicted the imminent industrial expansion of the entire Southeast, particularly North Carolina.

Dayton's major foam rubber plants are located near High Point, N. C., and Los Angeles, Calif.

1,4-Butanediol Price Cut

The price of its 1,4-butanediol, a chemical intermediate for plasticizers, polyester resins, polyurethanes, textile auxiliaries, and pharmaceuticals, has been reduced by General Aniline & Film Corp., Antara Chemicals Division, New York, N. Y., from 40¢ to 33¢ a pound. The product is available in semi-commercial quantities from the company's Linden, N. J., high-pressure acetylene derivatives pilot plant.

Further price reductions are anticipated shortly after completion of GAF's new $6,000,000 plant at Calvert City, Ky.

New General Tire Flooring

The General Tire & Rubber Co., Akron, O., has formed a new flooring division, with manufacturing activities centered at its Jeannette, Pa., plant, and sales directed through its Akron headquarters, it was revealed by J. E. Powers, vice president in charge of plastics.

Also disclosed was the development of a homogeneous vinyl flooring to be called Bolta-Floor, a moderate-to-high-price tile, the first in a forthcoming line. The tile is available in 27- and 54-inch rolls and in all commonly used sizes of tile. Thicknesses are 1/8- and 3/32-inch and 0.080-gage.

American Latex Expansion

A 20,000-square-foot warehouse and shipping building has been constructed for American Latex Products Corp., Hawthorne, Calif., adjacent to its present facilities. The $90,000 addition, part of the firm's expansion program for the 1955-56 period, has increased the total plant floor space to 85,000 square feet.

According to Clowes M. Christie, president, the company is the world's largest manufacturer of foam rubber and a pioneer since 1952 in the development of polyurethane rigid and elastomeric foams known commercially as Stafoam and Polyrubber.

GE Raises Plastics Prices

What is called the first general price increase in plastics manufacturing since 1952 has been announced by General Electric Co., plastics department, Pittsfield, Mass. Included in the boost are prices for injection molding, compression molding, silicone rubber fabricating, and GE mycalex manufacturing.

G. S. Berge, manager of marketing for the department, attributed the price upgrading to higher materials and labor costs, combined with the relatively low selling price levels of the last two years.

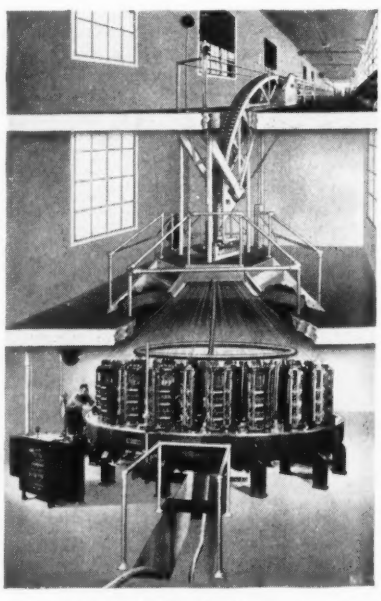
Prices have been increased as follows: injection molding (thermoplastic components), up to 3%; compression molding (thermosetting components), up to 4%; silicone rubber components, up to 4%; GE mycalex components, up to 5%; and sealing caps and sleeves, up to 5%.

National-Standard Braider

A 25-ton braiding machine with alternate decks up to 96 carrier size, said to be the largest braider of its kind in the world, is fabricating braid capable of sustaining end-loads as high as 60 tons at National-Standard Co., Niles, Mich., the company reveals. The braid is produced for the metal hose industry and for other tubular braid applications, including rubber hose and high-frequency cables.

The three-story-high machine commonly fabricates braids as large as 22 inches and could make a braid 30 inches in diameter by use of the mandrels of proper size, according to National-Standard. The carriers in the 96 carrier deck can handle wire up to 0.028-inch in diameter and as many as 15 parallel wires, and 29 wires or groups of small diameter wires in braided braid, which is tubular braid constructed of multiple flat braids.

The braider is driven by a 30-hp. motor, and a 2-hp. motor is used to power the conveyor in setup operations. The unit was developed jointly by National-Standard and Textile Machine Works, Reading, Pa., for experimental work and was subsequently adapted to its present use. A specially designed set of tracks was also constructed to facilitate the interchange of decks.



National Standard's 25-ton braiding machine

In over 100 places, Enjay Butyl rubber parts

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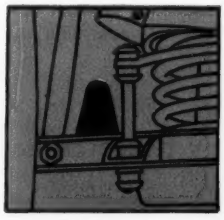
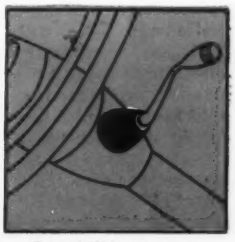


Axle bumper

Body seals, gaskets, insulators, pads, grommets, etc.

Brake and accelerator pedal pads, bellows

Radiator and heater hoses, ducts



Gearshift lever cover

Pontiac has been using parts made of Enjay Butyl since 1946. The great '56 model now incorporates more than 100 parts made from this super-durable rubber, adding to its performance, style and value. These parts have amazing resistance to deterioration and will easily last the life of the car.

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35 SUCCESSFUL YEARS OF LEADERSHIP IN SERVING INDUSTRY

Farrel-Birmingham Buys W-S Press Division

Farrel-Birmingham Co., Inc., Ansonia, Conn., has purchased the business of the press division of Watson-Stillman Co., division of H. K. Porter Co., Inc., Roselle, N. J. The deal is said to involve the transfer to Farrel-Birmingham of the press division's engineering and sales sections, patents, drawings, jigs, and fixtures, but will include no portion of the Roselle plant.

According to Farrel-Birmingham, the purchase rounds out the company's lines of processing machinery with the addition of presses of proven design and reputation. Engineering and sales activities for the presses will continue at Roselle, with the manufacture of the presses being sustained at the Roselle facilities until December 30, when their production will be transferred to Farrel-Birmingham plants.

Shannon to Defense Post

Lee R. Shannon, budget director of The Firestone Tire & Rubber Co., Akron, O., has been appointed Deputy Assistant Secretary of Defense by Secretary of Defense Charles E. Wilson. Mr. Shannon, the first appointee to the newly created position, will have responsibility for programming and planning the operations of the office of Wilfred J. McNeil, Assistant Secretary of Defense.

Mr. Shannon first became associated with Firestone in 1935 as a member of its auditing staff, serving in that capacity until 1941, when he was named comptroller of Firestone Rubber & Latex Products Co. Between 1943 and 1945 he was civilian manager of the Blue Grass Ordnance Depot at Richmond, Ky. He became Firestone's budget director in 1946.

Erects Marlex Sales Lab

A new sales service laboratory is being built by Phillips Chemical Co. at Bartlesville, Okla., which will provide 15,000 square feet of floor space for sales services and development work in relation to the firm's forthcoming commercial production of its thermoplastic ethylene polymer, Marlex 50. The one-story structure will adjoin the chemical research laboratories now being constructed at the Phillips Research Center by the parent organization, Phillips Petroleum Co.

Marlex 50 is expected to become available in 1956 upon completion of the first unit of a manufacturing plant at the company's Adams Terminal facilities on the Houston Ship Channel.

According to Phillips Chemical, the new sales service laboratory will have the latest equipment for evaluating, converting, and fabricating plastics, primarily Marlex 50 and related polymers. A resident staff of sales service and development engineers is being prepared for customer service, development, and proving of new uses for Marlex polymers and for product evaluation.

Arthur Patureau

U. S. Army Photograph

Lee R. Shannon

Diamond Alkali Ups Hirsch

Diamond Alkali Co., Cleveland, O., has created the position of research scientist at its Painesville, O., research center and has named Alfred Hirsch to the new post, it has been announced by John A. Sargent, president.

"The position of research scientist is being established by Diamond as the first step of a long-term program designed to recognize, within our organization, scientific achievement entirely apart from administrative functions," the chemical manufacturing executive said.

Dr. Hirsch, who joined the company as a chemist in 1928, was senior group leader at the research center before his present appointment. His research interests have included the basic alkalies, calcium carbonates, chromium chemicals, and chlorinated organics.

He is currently chairman of the Northeastern Ohio Section, American Chemical Society, and is a member of the American Association for the Advancement of Science.

Fire, Accident Control Guide Issued

An "Index and Directory" of fire and accident control codes, standards, and references has been made available by Loss Control Associates, Plattsmouth, Neb., for the purpose of providing a fast and reliable means of finding any information on accident prevention, fire control, and health and sanitation contained in nationally recognized codes and standards and reliable references.

Said to have taken eight years to assemble, the publication consists of an index to sources of information on fire and accident control, a guide to the manifold phases of the subject, and a directory of available publications in the field. A semi-annual supplement will be issued to the volume, with necessary revisions.

Picco West Coast Office

Pennsylvania Industrial Chemical Corp., Clairton, Pa., has opened a new West Coast district office in Los Angeles, Calif., and has appointed Arthur Patureau, West Coast sales manager. The new office will serve as both a sales and technical development center for the entire western United States.

Mr. Patureau most recently was associated with Minneapolis-Honeywell Regulator Co., serving as reactor controls consultant to Westinghouse atomic power division in the development of the *Nautilus* atomic-powered submarine engine. Previously he had been chief application engineer for Fischer & Porter Co.

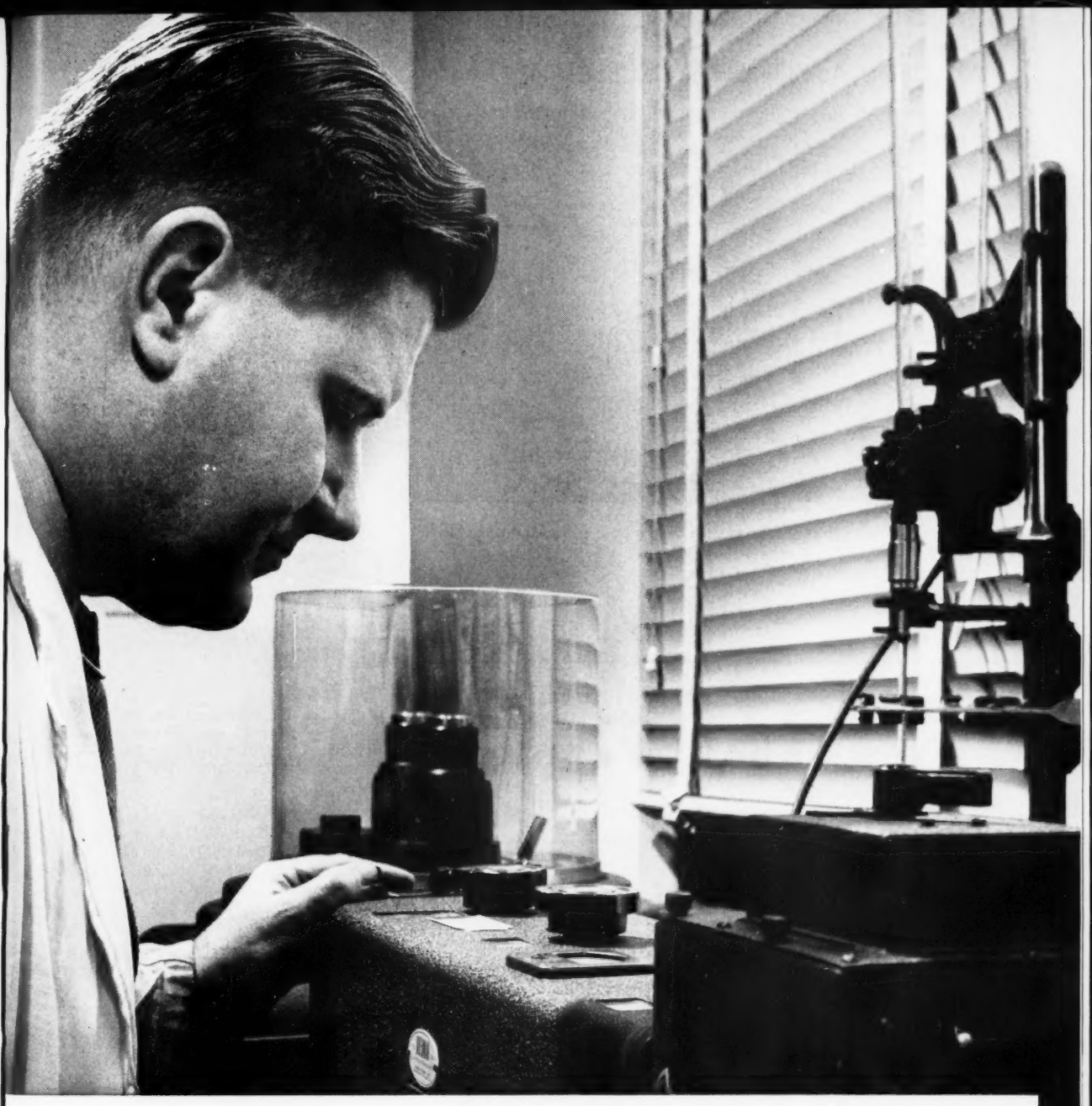
Open Mobay Research Lab

The polyurethane research laboratories of Mobay Chemical Co., St. Louis, Mo., have been completed and are in operation at New Martinsville, W. Va., on the site of the company's urethane raw materials production plant, the first such full-scale facility in the United States.

The laboratory, a 40,000-square-foot, three-story building, will be used for process development, application research, and testing of materials for the new urethane field. Director of the unit is E. E. Hardy, formerly with the inorganic chemicals division, research department, of Monsanto Chemical Co., co-owner, with Farbenfabriken Bayer, of Mobay.

The laboratory is constructed of steel and precast concrete panels and has five complete modules, each containing two standard 20- by 30-foot, four-man laboratories, a specialized utility laboratory, and two ten-foot-square cubicles.

There is also an open bay, containing 8,400 square foot of floor space, for application research machinery. Included here is a full-scale foam machine for converting the isocyanates and polyesters into flexible or rigid foams, permitting laboratory application work on the same basis as complete production in a customer's plant. Other equipment are laboratory-size foam machines and wire-coating machine, said to be one of the most modern experimental machines in the country.



This color "fingerprinter" can't be fooled!

Production samples of Glidden chemical compounds must pass the rigid "fingerprint" test of the Spectrophotometer. Each compound has its own absorption spectra which must match the master sample. This method of testing is the most accurate known for color consistency and particle uniformity.

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Voit Opens Additional Units at Portland, Oreg.

Aerial view of Voit's tread rubber and tire repair manufacturing facility at Portland, Oreg.

W. J. Voit Rubber Corp., Los Angeles, Calif., has opened its new $500,000 addition to its Portland, Oreg., facilities which will double the firm's production of tread rubber and tire repair materials there. The addition consists of three separate buildings occupying more than 60,000 square feet, at 2344 N. Columbia Blvd.

Included among the new equipment is a giant Banbury mixer whose operations are controlled by a single operator at a control panel. Other features of the new installations include a self-sufficient water supply and waste disposal system, a spur railroad track, and a small, separate plant for the manufacture of rubber cement.

The facilities are entirely electrically operated, including the heating system. Nine transformers handle 150,000 kilowatt hours of electricity monthly. The design of the buildings does not include smokestacks, making for the complete absence of fumes and odors .

Attending opening-day ceremonies were Voit President Willard D. Voit, Vice President Page Parker, Portland General Manager Harry A. Wright, Portland Factory Manager Neil W. McIntyre, and Company Advertising Manager Herb Larson. Portland Mayor Fred L. Peterson also was present.

News about People

Robert T. Armstrong has been elected vice president and technical director of Celanese Corp. of America, New York, N. Y. Associated with the firm since 1946, Dr. Armstrong coordinated its research leading to the development of the new triacetate fiber, Arnel. He is also noted for his work on the vulcanization of rubber, synthetic rubber, and tire cord.

Theodore R. von Toerne has been appointed mechanical engineer and technical service representative for the Barrett Division, Allied Chemical & Dye Corp., at its Shadyside Research Laboratory, Edgewater, N. J.

Raymond Lapierre has joined Reeves Bros., Inc., New York, N. Y., as sales representative in the Vulcan Rubber Products Division; he will cover the Michigan, Ohio, western Pennsylvania, and western New York areas.

Donald V. Sarbach has joined Hewitt-Robins, Inc., Stamford, Conn., as research director. He was formerly technical manager for development of new industrial products for The B. F. Goodrich Co. and is the holder of more than 30 patents on rubber and chemical products and processes.

S. L. Duff has been reassigned to sales representative for the pigments division of American Cyanamid Co., New York, N. Y.

Charles A. Chabot, Jr., has joined Peters Mfg. Co., Wollaston, Mass., as director of research.

Donald V. Sarbach

Ralph W. Burdeshaw has been named southern district manager of industrial resins sales for Barrett Division, Allied Chemical & Dye Corp., New York, N. Y.

Francis E. Weisend has been advanced to plant manager of The B. F. Goodrich Co. Plastics Products Division plant, Marietta, O., and will be succeeded as plant engineer by **E. Wilbur Johnson,** formerly design engineer.

Olin D. Blessing, sales manager of Dow Corning Corp., Midland, Mich., and the firm's first full-time employe when it started business in 1943, has been made a vice president of the company.

Olin D. Blessing

NEW

PLASTOLEIN® 9404 TGP

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synthetic rubber plasticizer
at lower cost!

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For example, as compared to other more expensive glycol-type esters and adipate plasticizers, 9404 gives lower heat loss, lower compression set, less water sensitivity and equivalent low-temperature flexibility.

In addition, since Plastolein 9404 is produced in accurately controlled equipment from easily obtainable domestic raw materials, high quality standards are maintained and continuing availability assured.

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John H. Lucas

Neal J. Crain

John H. Lucas and **Joseph E. Dickinson** have been appointed to the board of directors of United Engineering & Foundry Co., Pittsburgh, Pa., and **Neal J. Crain** has been elected vice president in charge of purchases. Mr. Lucas is chairman of the board of directors of the Peoples First National Bank & Trust Co. and holds directorships in 13 other companies and business organizations. Mr. Dickinson entered United's employ in 1937 as manager of its patent department and has been manager of its legal department since 1944; he is currently serving on the Industry Advisory Committee to the U. S. Governmental Interagency Technical Property Committee for Defense. Mr. Crain has served the company since 1914 and became its director of purchases in 1951.

Edgerly W. Austin, general manager, automotive division, The Timken Roller Bearing Co., Canton, O., has retired after 36 years of service with the company and will be succeeded by **Robert G. Wingerter,** assistant general manager, who has been with the firm since 1938. Mr. Austin will remain associated with Timken in a consulting capacity.

William A. Ladd, pioneer in electron microscopy, has joined Foster D. Snell, Inc., New York, N. Y. He was most recently associated with Columbian Carbon Co., where for 15 years he worked on carbon black studies.

Albert J. Gracia has been named manager of research and development for The Goodyear Tire & Rubber Co., Akron, O., and has been succeeded as general manager of Goodyear Atomic Corp., Portsmouth, O., by **Donald H. Francis,** formerly manager of development engineering there. Mr. Gracia, associated with Goodyear since 1928, helped develop the continuous polymerization process of synthetic rubber production during World War II. Mr. Francis has also been active in the company's synthetic rubber production during his 16-year association with Goodyear.

Joseph E. Dickinson

Harvard Studio

Robert VanPatton-Steiger

D. R. Beasley and **Mrs. Mary A. Bresnahan** have been named to the fine chemicals sales group of Carbide & Carbon Chemicals Co., division of Union Carbide & Carbon Corp., New York, N. Y. **J. D. Mueller** and **Arvid Teleki** have been appointed to the firm's Crag agricultural chemicals sales group and market research department, respectively. Assigned as technical representatives are **A. P. Chavent,** Cincinnati district; **A. A. Douglas,** Charlotte district; **W. P. Emerson,** Atlanta district; **J. F. Flynn,** Boston district; **J. T. Fox,** New Orleans district; **R. F. Gildehaus, Jr.,** Philadelphia district; **D. P. Shannon,** Kansas City district; **B. H. Wilder,** Detroit district; and **R. W. Wittmus,** Indianapolis district.

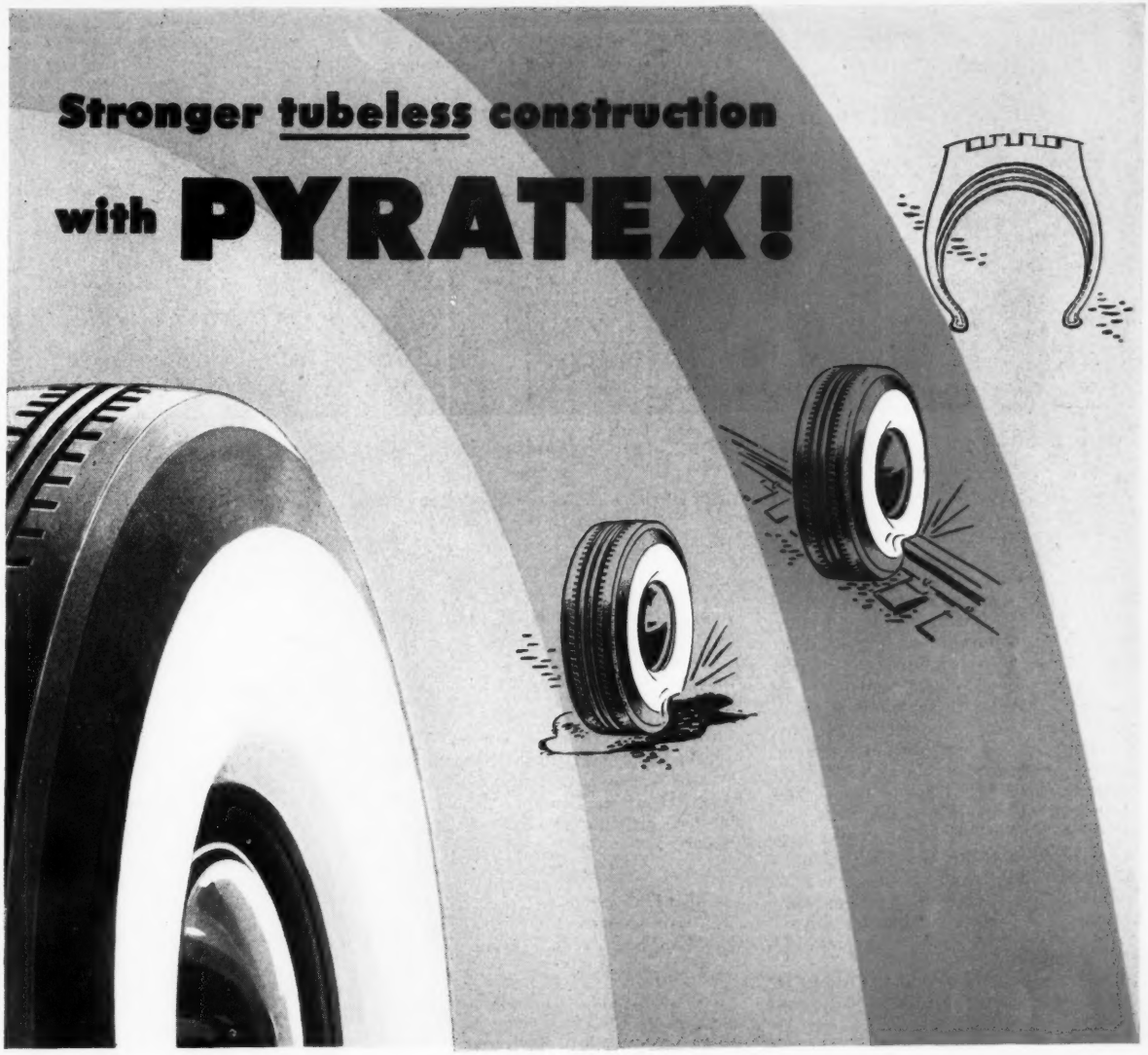
William H. Davis, Jr., has been named director of sales development of Petro-Tex Chemical Corp., Houston, Tex. He was formerly associated with Magnolia Petroleum Co. and Monsanto Chemical Co.; the latter service included work as a process engineer, in sales development, and as a sales representative.

Philip A. Singleton has been appointed assistant to the president of Monsanto Chemical Co., St. Louis, Mo., and secretary of its executive and finance committees, succeeding **J. P. Ekberg, Jr.,** who is returning to the company's organic chemicals division as manager of intermediate sales.

T. Scott Avary has been elected president of Wellington Sears Co., New York, N. Y., while retaining his positions as treasurer and member of the board of the firm. He will also continue as vice president of West Point Mfg. Co., West Point, Ga.

Robert VanPatton-Steiger has been appointed technical sales representative to the New England area by Harwick Standard Chemical Co., Akron, O., and **George R. Huhn** has been named technical sales representative from the Chicago office.

George R. Huhn



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Division of United States Rubber Company

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Don R. Kuespert | Edward J. Strube | A. J. Hawkins, Jr. | John R. Galloway | Richard W. Ward

A. J. Hawkins, Jr., has been transferred to assistant manager of the Los Angeles sales district of the elastomer division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and has been succeeded as technical sales representative in the Akron district's Houston, Tex., sub-office by **John R. Galloway,** who in turn has been succeeded as representative in the eastern district's Atlanta sub-office by **Edward J. Strube,** formerly of the sales promotion section in Wilmington. **Richard W. Ward,** of the sales promotion section, has been appointed technical sales representative in the New England district, succeeding **Robert A. Hammond,** who will aid in the start-up of the firm's new neoprene plant in Montague, Mich. **Don R. Kuespert,** compounder at the division's Akron Rubber Laboratory, has been transferred to the sales promotion section.

W. Raymond Myers and **Charles D. Thompson** have been advanced to assistant sales manager and assistant manager of original equipment sales, respectively, of the metal products division, The Goodyear Tire & Rubber Co., Akron, O.

Edmond S. Bauer and **Thomas W. Sears** have been advanced to assistant director of sales for resin products and sales manager of industrial resins, respectively, in the plastics division of Monsanto Chemical Co., Springfield, Mass.

Dwight Williams, chief of the biology and chemical branch, Quartermaster Research & Development Command, United States Army, has joined Michigan Chemical Corp., St. Louis, Mich., as director of research.

George W. Mannion, sales manager, Goodall Rubber Co., Trenton, N. J., has been cited by United Cerebral Palsy for his activities as New England regional vice president of the organization during 1954-55.

Herbert S. Parham, manager of intermediate sales, organic chemicals division, of Monsanto Chemical Co., St. Louis, Mo., has been advanced to assistant director of sales for planning in the division.

Lee Cisneros has been promoted to general traffic manager of Godfrey L. Cabot, Inc., Boston, Mass.

A. W. Rose, vice president of Borg-Warner Corp., Chicago, Ill., has been named vice president and general manager of the firm's petro-mechanics research division, North Hollywood, Calif.

Robert J. Koch and **John R. Wilson** have been appointed to the research division of The Goodyear Tire & Rubber Co., Akron, O., in the diene synthetic rubbers and high polymer research sections, respectively.

Clifford A. Brooks has been named advertising manager for Pratt & Whitney Co., Inc., West Hartford, Conn.

Wilfred A. Smith has been advanced to manager of new product sales for The B. F. Goodrich Co. Industrial Products Division, Akron, O., with additional responsibility for sales of industrial products to government agencies. He has been associated with the Goodrich organization since 1924.

William M. Saltman has joined the diene synthetic rubbers section, research division, of The Goodyear Tire & Rubber Co., Akron, O.

Donald R. Spotz has been advanced to general sales manager of the Pesco Products Division of Borg-Warner Corp., Chicago, Ill. He has been with the firm since 1941.

I. W. Robertson has joined Standard Products Co., Detroit, Mich., in a sales and development engineering capacity. He was formerly with Dryden Rubber Division as chief engineer and as director and manager of the Detroit sales office.

William R. Hartman has been named technical superintendent of Laurie Rubber Reclaiming Co., East Millstone, N. J., succeeding **Clarence B. Clark,** who has retired after 41 years of service with the firm.

Kenneth H. Barratt has been appointed a sales representative in the latex and lotol department of Naugatuck Chemical Division, United States Rubber Co., New York, N. Y.

Kurt Albrecht has joined the detergent section of the silicate, detergent, calcium division of Diamond Alkali Co., Cleveland, O., as research chemist.

John E. Capizzano, eastern sales manager of American Mineral Spirits Co., Chicago, Ill., has been elected assistant vice president of the firm.

D. R. Mackie has been named acting managing director of Monsanto Chemicals, Ltd., London, England. He has been with the company since 1924.

Daniel B. Witwer has been appointed manager of the acetylene chemicals department of Antara Chemicals, a sales division of General Aniline & Film Corp., New York, N. Y.

Winton C. Koch has been named manager of tire sales promotion for The Dayton Rubber Co., Dayton, O.

David Maimin has been tendered a testimonial dinner commemorating his fiftieth year with H. Maimin Co., Inc., New York, N. Y.

Peter G. Arvan and **Gilbert J. McEwan** have been advanced to assistant director of research and research group leader, respectively, of the inorganic chemicals division, Monsanto Chemical Co., St. Louis, Mo.

Daniel J. Girardi has been named metallurgical engineer in charge of research and process control at The Timken Roller Bearing Co., Canton, O.

Howard A. Blyth, formerly senior management analyst for American Cyanamid Co., New York, N. Y., has been named assistant to the general manager of the firm's organic chemicals division.

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George M. Stephenson, formerly with the market development department of Nova Chemical Corp., has organized Miller-Stephenson Chemical Co., Inc., New York, N. Y., for the sale of Vistanex dispersions to the rubber industry.

E. A. Malick has been promoted from assistant manager to manager of the rocket fuels division, research and development department, Phillips Petroleum Co., Bartlesville, Okla. Also named at the division's McGregor, Tex., site were **L. A. Macuila,** to assistant manager; **A. E. Inman,** to manager of management services; **J. F. Sauls,** to manager of employe relations; **J. E. Dillingham,** to manager of contracts and finance; and **R. J. Martinelli,** to assistant manager of manufacturing. **E. F. Fiock** has been appointed technical director of a new technical development branch, with **J. A. McBride** as assistant technical director.

J. Warren Kinsman, a director, a vice president, and a member of the executive committee of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has resigned after a 40-year association with the company. He began his career with Du Pont in 1915 as a timekeeper and rose through various sales, production, and research positions in the explosives, chemical, dyestuffs, plastics, and fabrics and finishes departments of the firm.

John G. Costello, Jr., has been appointed production manager of the Fremont, O., plant of Hewitt-Robins, Inc., Stamford, Conn.

James O. Hendricks and **Carl J. Calabrese** have been advanced to manager of research and development and manager of products control, respectively, of the fibrous and industrial tape division of Minnesota Mining & Mfg. Co., St. Paul, Minn.

Raymond Penhallow and **Arthur Sarafain** have been appointed technical sales representative and chief chemist of the rubber manufacturing division, respectively, of Wild & Stevens, Inc., Newton Upper Falls, Mass.

Jesse A. MacIntire, Jr., has been advanced to manager of wire braid hose sales, Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O., and will be succeeded as Chicago district manager by **Irving G. Wollter,** formerly field representative in that area.

Lee H. Clark, general manager of the Sharples Chemicals Division of Pennsylvania Salt Mfg. Co., Philadelphia, Pa., has been named vice president of the parent company and will assume duties in corporate organization and planning. He was made executive vice president of Sharples Chemicals in 1950 and president in 1954. When Sharples Chemicals became a division of Pennsylvania Salt early in 1955, Mr. Clark was made general manager.

George M. Stephenson

Robert M. Logan

Robert M. Logan has joined R. T. Vanderbilt Co., New York, N. Y., as technical sales representative in the Ohio district, and **H. Haynes Farmer** and **Jack C. Bacon** have been added to the company's research laboratory staff at East Norwalk, Conn.

Virgil W. McDaniel has been named president of the Cotan Division of Interchemical Corp., Newark, N. J., succeeding **C. T. Melvin,** who is retiring. **Russell F. Tandy** has been appointed head of the division's development department, and **John Kuser** has been named assistant sales manager. Cotan Vice President **Robert L. Lewis** has been given additional duties in production.

William V. Stout has been made personnel manager of the Marion, O., plant of The B. F. Goodrich Co. Industrial Products Division, Akron, O.

Robert H. Kilgore has been named manager of the flooring division of The General Tire & Rubber Co., Akron, O.

Clayton F. Ruebensaal has been appointed director of commercial planning for Texas-U.S. Chemical Co., New York, N. Y. His functions will include the direction of corporated planning for the expansion of the chemical company's synthetic rubber facilities at Port Neches, Tex., planning the company's entry into new fields, and investigating marketing aspects of proposed expansions.

Russell W. Sloan has been advanced to manager of commercial development of Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Robert W. Cairns has been advanced to director of research for Hercules Powder Co., Wilmington, Del., succeeding **Emil Ott,** who has resigned. Associated with the company since 1934, Dr. Cairns was engaged in the study of rocket propellants for the U. S. Army Ordnance Department during World War II and in 1953 served for one year as Deputy Assistant Secretary of Defense for research and development.

Ralph H. Tyrell, vice president and a director of The Stalwart Rubber Co., Bedford, O., and its chief chemist for 23 years, has retired. Mr. Tyrell, 73, will remain available to the company as consulting engineer.

Robert Coates has been advanced to manager of the diversified products sales department of Seiberling Rubber Co., Akron, O.

Edmund Greene has been appointed assistant director of the advertising department of Monsanto Chemical Co., St. Louis, Mo., and will be succeeded as advertising manager, organic chemicals division, by **Wilbur H. Grosse. H. Chandler Holmes** will replace Mr. Grosse as corporate advertising manager. **John C. Sparkman** has been named manager of creative services.

Skeist Laboratories, 89 Lincoln Park, Newark, N. J., has begun business as a product, process, and market researcher on polymers, plasticizers, adhesives, resins, and coatings. Director of the laboratory is Irving Skeist.

Wellco-Ro-Search, Waynesville, N. C., has awarded $10,000 to Earl Mashburn, an assistant chemist with the associated companies, for his suggestion leading to the development of improved sponge rubber soles.

St. Joseph Lead Co., New York, N. Y., has appointed R. E. Carroll, Inc., sales representative for St. Joe zinc oxides in the Trenton, N. J. area.

Minnesota Rubber & Gasket Co., Minneapolis, Minn., has moved its St. Louis district office to 8131 Manchester Blvd., Brentwood, Mo. **Curtis Beem** and **Gene Raemdonck** head the office.

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News Briefs

B. F. Goodrich Chemical Co., Cleveland, O., is the manufacturer of the new dinitrile fiber, Darlan, whose first commercial application is in a fur-like fabric, Borglura, made by George W. Borg Corp., Delavan, Wis.

The Goodyear Tire & Rubber Co., chemical division, Akron, O., has begun construction of a $3,500,000 addition to its Chemigum plant, scheduled for completion in August, 1956.

Anaconda Wire & Cable Co., New York, N. Y., has placed on the market a so-called reverse-lay preassembled aerial cable with Type AB butyl rubber insulation and neoprene jacket.

Dayton Rubber Co., Dayton, O., has made available to distributors and dealers a wall chart that provides service personnel with complete information about the servicing of tubeless tires.

North American Philips Co., Inc., research and control instruments division, Mount Vernon, N. Y., has opened a new West Coast office at 1485 Bayshore Blvd., San Francisco, Calif., under the management of Philip I. Wolf.

Rolis, Inc., a new firm offering manufacturing and engineering services to the rubber and plastics industries, has been established with offices and plant at 1240 E. 14th St., Brooklyn 30, N. Y. Robert Tillis is president.

Buffalo Weaving & Belting Co., Buffalo, N. Y., employs one of the few women pilots, Miss Louise Sacchi, for its Beechcraft Bonanza single-engine company airplane to transact certain company business by air. The firm has another plant in Alliance, O.

United States Rubber Co., New York, N. Y., has produced a 14-minute, 16-mm. motion picture film, "What Makes a Boy?", which may be borrowed for private showing from the company's public relations department or from Modern Talking Picture Service, Inc., film exchanges.

The Goodyear Tire & Rubber Co., Akron, O., has supplied its Suburbanite snow-and-ice tires for use on the only motorized, wheeled vehicle other than aircraft now in the Antarctic on the U. S. Navy's South Pole expedition, a Willys Motors' jeep.

The Eagle-Picher Co., pigment division, Cincinnati, O., has appointed Akron Chemical Co., Akron, O., as its technical and sales representative for zinc oxide to the rubber industry in Ohio, Indiana, Michigan, western New York, and western Pennsylvania.

Monsanto Chemical Co., plastics division, Springfield, Mass., is constructing additional facilities to triple its production capacity of Opalon 410, its vinyl chloride paste resin. The project will be completed in mid-1956.

Stauffer Chemical Co., New York, N. Y., has absorbed Consolidated Chemical Industries, New York, N. Y., boosting Stauffer's total assets to $125,000,000.

Hooker Electrochemical Co., Niagara Falls, N. Y., and Pennsylvania Salt Mfg. Co., Philadelphia, Pa., have jointly formed Chemical Salt Production Co., at Great Salt Lake, Utah, to provide a new source of industrial salt for the Northwest, where both firms have large salt-consuming industrial plants.

Wellco-Ro-Search, Waynesville, N. C., has doubled its machine shop capacity handling export orders for vulcanized footwear equipment.

United States Rubber Co.'s Washington, D. C., office has been moved from the Munsey Bldg. to 1700 K St., N.W., suites 1001 and 1002.

Arthur D. Little, Inc., Cambridge, Mass., has opened a branch office at 1625 Eye St., N. W., Washington, D. C., under the supervision of C. Lincoln Jewett and Miss Jerry Wallace.

Pennsylvania Salt Mfg. Co., Philadelphia, Pa., has begun construction of a large organic fluorine chemicals plant at Calvert City, Ky., in what is said to be the start of a projected expansion program. Scheduled to begin operations in 1956, the new plant will initially serve the refrigerant and aerosol-propellant fields. According to the company, these new facilities will become a major component of its closely integrated chlorine-fluorine production units on the Tennessee River. Future products from this plant and related facilities on the same location are expected to find uses in plastics, lubricants, metal fluxes, anesthetics, ceramics, agricultural chemicals, and new applications in the atomic energy field.

A. Schulman, Inc., New York, N. Y., has moved its office quarters to 460 Park Ave., New York 22.

Stauffer Chemical Co., New York, N. Y., has begun construction of a new addition to its Chauncey, N. Y., research center, at an estimated cost of more than $250,000. The 8,000-square-foot adjunct is expected to be completed by July.

J. W. Neff Laboratories, Inc., Stockertown, Pa., has been making traffic markers and strips of B. F. Goodrich Chemical Co.'s Geon vinyl plastic. Called Nefslabs, the products are glued to pavements and are said to eliminate repainting of traffic lines and markers.

Aldan Rubber Co., Philadelphia, Pa., has added 17,500 square feet of space in the form of offices and warehouse facilities.

The B. F. Goodrich Co., Akron, O., is manufacturing aircraft tires, designed to meet the requirements of high frictional temperatures, which are said to have been successfully tested in temperatures as high as 280° F., under peak loads of 19,000 pounds, and at landing speeds up to 170 miles an hour.

The Dayton Rubber Co., Dayton, O., is painting its Blue Ribbon Thorobred tire line with a blue water-soluble paint before shipment to prevent scuffing and soiling of the white sidewalls. The paint is rinsed off with water after the tire has been mounted.

The Goodyear Tire & Rubber Co., Akron, O., has introduced a new hydraulic tire-changing tool, known as TO-100, for earth-moving vehicles, which is applicable to rims of both tubeless and tubed tires.

FINANCIAL

Anaconda Wire & Cable Co., New York, N. Y. First nine months, 1955: net profit, $4,651,569, equal to $5.51 each on 843,962 capital shares, compared with $3,461,714, or $4.10 a share, a year earlier.

Belden Mfg. Co., Chicago, Ill. First nine months, 1955: net income, $960,470, equal to $2.49 a share, against $679,122, or $1.76 a share, in the 1954 period.

Sidney Blumenthal & Co., Inc., New York, N. Y. January 1-September 30, 1955: net loss, $1,240,980, against net loss of $753,915 a year earlier.

Carborundum Co., Niagara Falls, N. Y. Nine months to September 30, 1955: net profit, $3,929,075, equal to $2.28 a share, compared with $2,419,366, or $1.41 a share, in the 1954 period.

(Continued on page 442)

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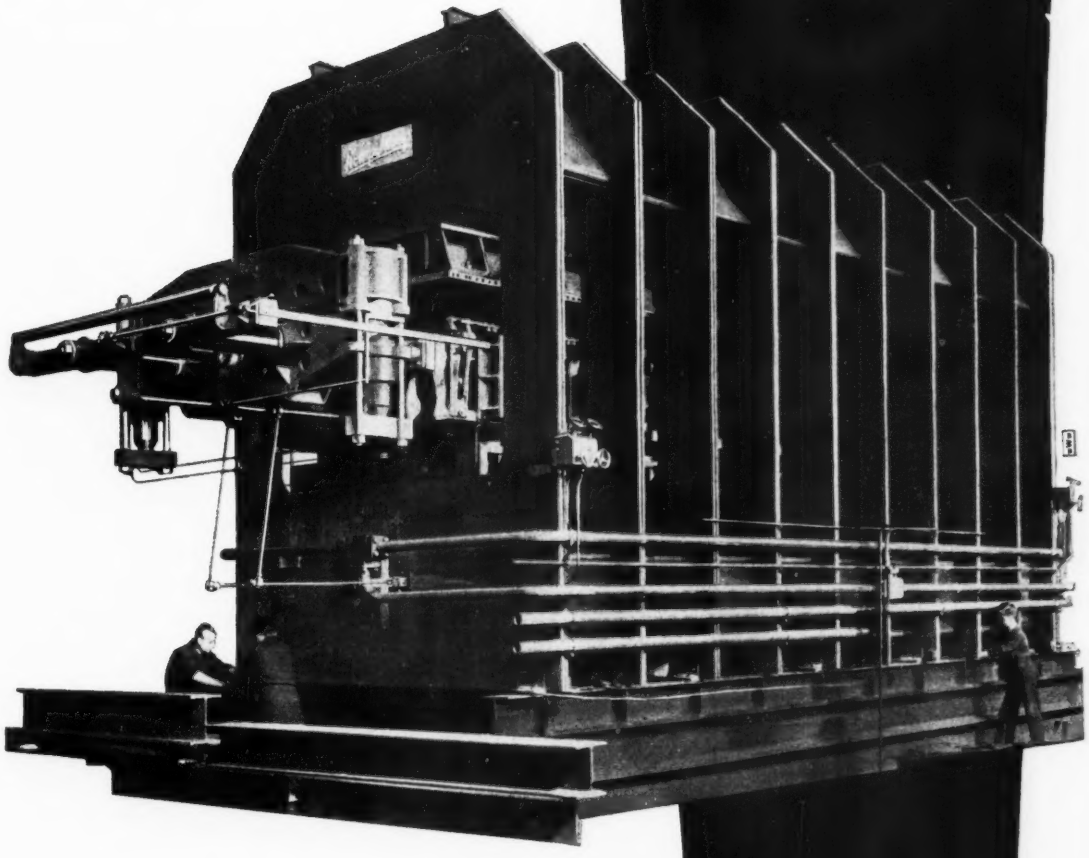

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News from Abroad

Netherlands

Inquiry on Latex Variability

In the latter part of 1954, Rubber Stichting, Delft, decided, with the aid of the rubber research institute in Bogor, Indonesia, and the British Rubber Development Board, London, England, to send a questionnaire to latex consumers all over the world in order to make a comprehensive survey of technological difficulties met in the application of latex that might be due to its variability. In all 123 replies were received from 14 countries, and an analysis, by M. Van den Tempel and A. J. de Vries, has been published as Communication No. 300 of the Stichting.

The inquiry showed that the processes most sensitive to variation in latex properties are those for foam, dipped goods, thread, and products from heat-sensitized latex—the processes employed by the vast majority of firms who sent replies.

Difficulties most frequently reported by foam manufacturers were variable rate of gelling, and foam collapse during gelation or after addition of coagulant by the others, variable sensitivity of latex to zinc oxide, apparent as undesirable thickening of the compound, low storage stability, or the formation of aggregations requiring troublesome filtration; also insufficient strength of wet gel.

Some of these difficulties may be caused by non-uniformity of the composition of the latex. Here is stressed the long-recognized need of introduction and standardization of a chemical stability test, that is, a test indicating the degree of sensitivity of latex to ZnO and other gelling agents. Since ZnO is always present as a component in latex compounds, and investigations have shown that zinc amine ions, formed on solubilization of ZnO in latex serum, play a dominant role in most "cold" and "hot" gelling processes, such a test should be based on the measurement of the sensitivity of latex to zinc amine ions in the serum. The early introduction of such a test seems possible.

Processing difficulties also are due to the failure of consumers to allow for the change in chemical composition and properties that latex undergoes in time; the change is fairly rapid in the first few months, but later a more constant level is reached, a fact which various large consumers take into account by using only latex at least six months old. Consumers should know the exact age of every consignment of latex, it is suggested. The development of foul odor, coagulum formation, and other undesirable changes reported for older latex may be due to inadequate preservation or improper storage.

In conclusion, it is stated that of the factors chiefly responsible for variability: origin of latex (botanical stock and location), tapping season (effect of wintering or defoliation of trees), methods of preservation and storage, and age of the latex, producers should be able to control all except the effect of seasonal variations, age of latex, and storage conditions after shipment. The consumer will therefore have to continue to control latex quality by suitable tests giving reliable information to permit necessary adjustments to be made in latex compounding and processing.

Flameproofing Foam Rubber

To overcome the hesitation of some countries to use foam rubber products on ships and airplanes, because of their flammability, Rubber Stichting undertook a series of tests to develop a suitable method of rendering the material flameproof. It was found that when latex foam rubber is impregnated with a solution of ammonium salts or urea, flame-extinguishing gases are developed when the material is ignited so that it does not continue to burn after the source of ignition has been removed. Further experiments indicate that the important properties of foam rubber, as tensile strength, fatigue resistance and permanent set, are not impaired by the treatment.

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Belgium

Rubber Road Construction

In September, 1954, a section of the road from Langenbrugge to Selzaete, Belgium, 500 meters long, was built with tar macadam in which rubber was incorporated. The rubber-tar macadam was spread on a 25-centimeter deep foundation of broken stone in two layers—first a sublayer of crushed stone coated with rubber-tar, and next a wearing layer of crushed stone, sand, filler, and rubber-tar binder. The road was finished with chips precoated with the same rubber-tar mixture.

The rubber used in the binder reportedly was a concentrate supplied by the S.A.P.A. concern of Geneva, Switzerland, containing 40% of pure rubber and was added to the tar in a proportion sufficient to yield a final product with a pure rubber content of 3% (on the tar). The mixing process apparently offered no difficulties and resulted in a homogeneous mixture in which the rubber was completely dissolved and which adhered perfectly to the pieces of stone. Drying of the layers took about an hour in each case, and no sweating at all was observed although the work was carried out in sunny weather with temperatures between 75 and 80° F. The precoated chips did not stick to each other and, when rolled after spreading, immediately adhered to the surface.

Incidentally, fillers precoated with a rubber mixture seem to be making headway in European road construction. In August, 1954, two sections of road surfaces laid in Paris contained such precoated fillers, and in Istanbul, a 1,000-square-meter section was recently completed in one of the main thoroughfares. The advantages claimed for these fillers are that they are quickly and uniformly mixed with the broken stone in the concrete mixer, giving a compact and stable mass; they make the use of rubber for roads more economical, and the quality of the surface is improved.

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Japan

Rubber Industry Statistics

The Japanese rubber goods industry includes about 500 establishments with annual production capacity of about 100,000 tons; these firms employ 67,000 workers, and their annual output is valued at U. S. $230,000,000. Production is mainly concentrated among a relatively small proportion of large concerns; the majority of the enterprises are small to medium; thus 110 plants, each employing more than 300 persons, account for 70% of total output, and the ten largest of these, including seven tire companies, account for 46% of total output. The seven tire companies are: Dunlop Rubber Co. (Japan) Ltd.; Yokohama Rubber Co. Ltd., (with Goodrich contacts); Bridgestone Tire Co., Ltd. (with Goodyear contacts); The Toyo Rubber Industry Co., Ltd. (with Atlas Supply Co. contacts); Ohtsu Rubber Industry Co., Ltd.; Nitto Tire Co., Ltd.; and Fujikura Rubber Works Ltd.

Marked ups and downs characterize Japan's consumption of rubber during the five-year period 1950-1954, as shown by statistics compiled by the Japan Rubber Manufacturers' Association. The totals rose from 60,230 metric tons in 1950 to 86,300 tons in 1954, with an intervening dip to 57,220 tons in 1951, a rise again to 64,050 tons in 1952, and a jump to 85,900 tons in 1953.

As these consumption figures indicate, the overall trend for most articles was upward, and we find the use of rubber for automobile tires and tubes more than doubling in the five years, rising from 13,600 tons in 1950 to 27,800 tons in 1954.

The increase in the consumption of latex was rapid: from 790 tons in 1950 to 3,290 tons in 1954. Synthetic rubber use rose from 100 to 2,700 tons.

Development on a similar scale is noted in rubber cloth, for which consumption increased 250%, from 2,210 to 5,170 tons; in rubber heels and soles—where a five-fold increase from 465 tons to 2,230 tons is noted, and in industrial goods, which rose from 4,000 to 7,750 tons.

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High-quality Butyl parts are close to becoming a reality as a result of work recently published by Esso Research. Their paper disclosing a reasonable technique for thermal interaction of Butyl-silica stocks will be available upon request as a Columbia-Southern reprint.

High loadings of reinforcing silica in Butyl have heretofore been characterized by an undesired boardiness. With the real improvement in snap, rebound, and resilience brought about by moderate thermal interaction, the excellent aging and weathering properties of Butyl may now be employed in far broader product lines.

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Consumption for rubber boots and shoes advanced from 10,350 tons in 1950 to 13,440 tons in 1954; for canvas shoes—from 4,340 to 5,140 tons; belting, from 2,570 to 3,880 tons; medical and sporting goods, from 970 to 1,250 tons. The pattern of consumption development for these items was similar—in each case there was a peak in 1953 followed by a certain drop in 1954. Electric wire and cable required 2,820 tons in 1950 and 3,215 tons in 1954, but there had been a peak of 3,665 tons in 1952.

The fluctuations in the case of other items terminated in a decrease by 1954 from the 1950 figures so that bicycle tires and tubes fell from 9,120 to 7,640 tons; rebuilt tires and tire repair material, from 2,270 to 1,970 tons; jikatabi (rubber-soled, one-toed, cloth shoes for workers), from 4,050 to 2,430 tons; and toys, from 1,210 to 640 tons.

Exports have increased steadily in recent years; the total value rose from U. S. $7,995,000 in 1952 to $14,471,000 in 1954; the 1955 figure is expected to reach $29,000,000. In 1954, tires represented about 36% of total exports; toys, rubberized cloth, belting, rubber-soled canvas shoes, mechanical goods and bicycle tires followed, in that order. The most important market is Formosa, followed by the United States, Ryukyu Islands, Singapore, Philippines, Iran, Hong Kong, Korea, and India.

•

Malaya

What Makes Prices Slump?

While it seems to be agreed that the slump in prices in the last week of October and early November was largely caused by the practical elimination of export duty on Indonesian rubber and subsequent large direct offerings of rubber to terminal markets, a much discussed question has been: what caused the first big break in the market?

The *Financial Times* of London logically goes back to what started the sudden spurt in prices last summer and finds that this was not simply due to the firmness of the statistical position, but to the sudden entry of Russia in the market in June, causing an "abnormal bulge" in a fairly steady trend in the year as a whole. The inference thus was that once the Russian factor was out, the earlier, steady trend naturally was resumed; at the same time the effect of the illness of President Eisenhower was not discounted.

The general feeling in rubber circles here is that speculators in rubber brought about the big drop, a view that the Federation Government evidently shares since it is understood to be considering measures to prevent further activities of speculators to depress the market. The price drop of some 40 cents per pound in less than a month, caused a loss to Malayan producers in that period of $50,000,000; while collections in export duty and anti-inflationary cess by the government decreased by $25,000,000.

The government wants a stable price for rubber, which it will attempt to insure by suitable action against speculators; this, it seems, may take the form of a prohibition of the practice of "off-setting" transactions by paying the difference between the agreed upon and the market price. A ban of this kind would force traders to discharge contracts by actual exports.

According to the *Straits Times* market correspondent, Singapore rubber men are inclined to doubt whether such a scheme would be either desirable or practicable. They point out that speculation has always been the mainstay of the market, and that speculators brought the price up to more than $1.50, which so greatly benefited government revenues. On the other hand, it would be well-nigh impossible to check actual transactions for shipments. The rubber men, however, seem to be ready to support limits on speculation to confine it to "healthy elements" and prevent every "Tom, Dick and Harry" from buying and selling rubber without putting up proper financial deposits. The government could perform a real service for the market by insisting on proper margins being put up by speculators, they feel; but abolition of speculation would kill the market.

Six-Day Work Week Won

Rubber plantation workers won their claim for a six-day week, and employers have agreed to pay time-and-a-half overtime rates for work on the seventh day. The further demand, for 21 days of paid holidays a year, has not yet been settled. In some quarters a rather gloomy view is taken of the effect of these new concessions. A leading Penang rubber broker reportedly estimated that it would cause a drop in annual production of about 54,000 tons, involving a loss of millions of dollars to producers. The estates, not the smallholders, moreover, would be affected, since the latter would probably continue tapping as now, with no annual paid leave or six-day week, and their production would remain at the present level of about 280,000 tons a year. The estates, however, which produce about 320,000 tons annually, would suffer the drop of more than 50,000 tons.

A planter, writing to the journal of the Incorporated Society of Planters (I.S.P.) raised a different point. Since 1946, he said, the history of labor negotiations in the plantation industry has been largely a chronicle of demands by workers and concessions by employers. The latter had missed the opportunity in one respect; they could fairly have demanded a union-sponsored drive to improve the standard of tapping. "The large-scale butchery of rubber trees" had not only cost employers millions of dollars but imperiled the economic future of the country. It was the reason for the pressing need of replanting now. In other countries, he added, a worker in a skilled field had to serve an apprenticeship to qualify for full union rates of pay, and employers would be doing the industry a disservice if they did not demand a better standard of workmanship.

While most of the claims of plantation workers have for the present been satisfied, there are rumblings in other workers' sections in and out of the industry. The refusal of the Rubber Packers' Association (almost wholly Chinese) to permit the Packers' Union to pass on its hirings and firings raised the threat of a strike which, the Association warned, it would counter by immediately closing all packing go-downs.

Larger Replanting Grant for Smallholders

Despite repeated warnings by A. C. Smith, Chief Replanting Officer, rubber replanting by smallholders continues disappointing. That the smallholder should be reluctant to cut out old rubber trees at a time when prices are the highest in years is understandable. From the very outset, however, when the scheme for smallholders was introduced in 1952, actual replanting has consistently lagged, being from 20,000 to 30,000 acres below the annual target. The scheme provides for the replanting of 500,000 acres altogether, about one-third of the total area of smallholder rubber. To date only 3% of the total smallholder planted area has been replanted, although there is a replanting grant which originally was $400 per acre, but which was raised to $500 per acre.

The government has now decided on two measures by which it hopes to speed up replanting: the grant is to be increased again, to $600 per acre, and this assistance, formerly limited to five acres, will be extended to a minimum of 10 acres.

Malaya's Future Bright

In considering the recent utterances of leading rubber men on the future of Malaya, one is struck by the optimistic acceptance of the political and social changes taking place though, to be sure, there is an undercurrent of caution.

H. B. van Praagh, managing director of Sandilands Buttery Co., Ltd., rubber exporter, and of the rubber estate agency of John Buttery & Co., Ltd., was quoted as saying, on the eve of his retirement from these firms and his departure for London, that he still thought Malaya a "darned good investment," none safer anywhere, provided labor was not misled politically. He spoke of the growing Asian participation in the Malayan rubber industry—a trend that would continue—and added that sensible European firms already were planning to Malayanize the senior jobs, and that they would gain by having people they like and who like them in their business when Malayanization came.

The general manager of Malayan American Plantations, V. Madsen, before leaving for America to assume the duties of managing director of United States Rubber Co.'s plantation division, was confident of the future of natural rubber. He was of opinion that potential investors in Malaya should not be frightened away by the growing independence of the government on the present sound basis.

European planters are not so optimistic. They quite openly express the fear that

(*Continued on page 442*)

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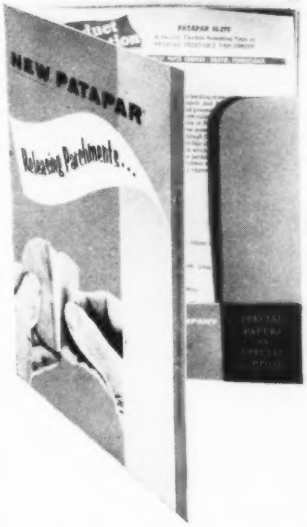

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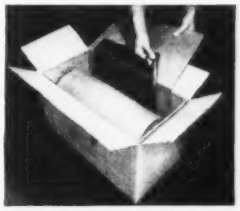

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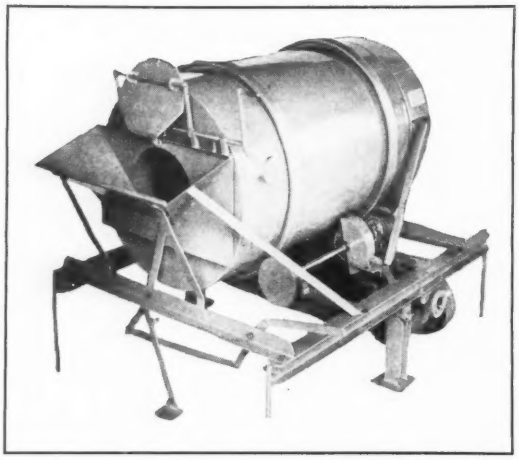

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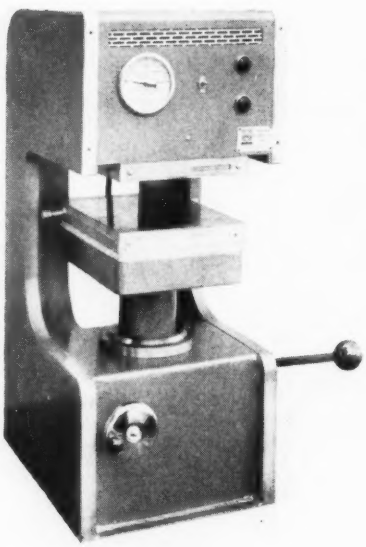
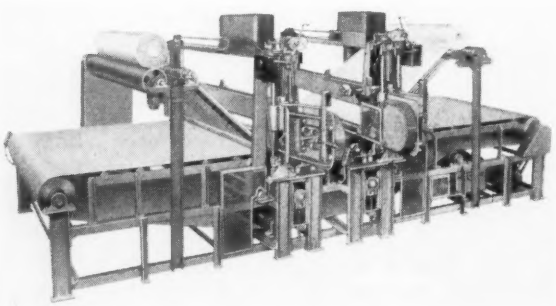


P.H.I. open-side press

Open-Side "C" Frame Presses

A group of open-side "C" frame presses ranging in platen size from 8 by 8 inches to 12½ by 12½ inches and in a tonnage range of 20 to 50 has been placed on the market by Pasadena Hydraulics, Inc., Pasadena, Calif. The machines are said to feature precision-ground platens with cast-in cooling coils and calrod heaters individually controlled by thermoswitches to 600° F., and a fast-action two-stage hydraulic pump that provides quick closing and produces maximum pressure.

Type OS-225, a 20-ton model with 8¾- by 12-inch platens, is said to have the following specifications: 4½-inch stroke, 4-inch ram, 4½-inch opening with quick removable adapter to obtain an additional four inches, height of 32 inches, base of 14 by 20 inches, and weight of 525 pounds.

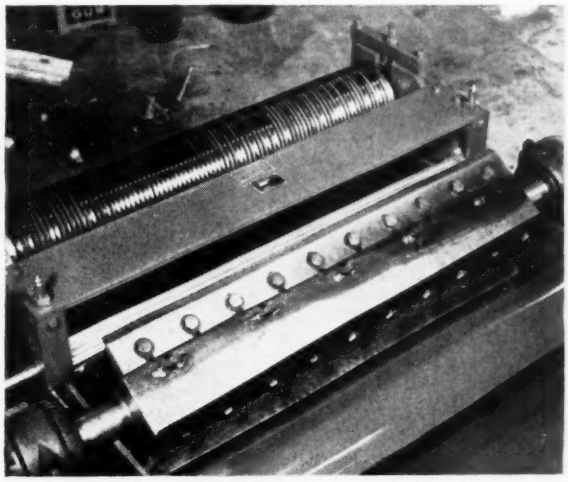


Falls Engineering polyurethane slab cutter

Conveyorized Polyurethane Slab Cutter

A conveyorized polyurethane slab cutter which splits the slabs to a predetermined thickness of 1/16-inch or more and converts

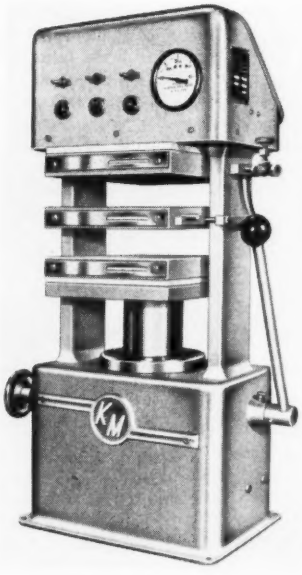
the resulting sheets to rolls ready for shipment has been placed on the market by Falls Engineering & Machine Co., Cuyahoga Falls, O., manufacturer of the equipment. The machine has two vertically adjustable splitting heads, and a conveyor belt 84 inches wide and 14 feet long. Blocks of polyurethane up to 25 feet long can be handled by the equipment, with longer blocks possible when roller conveyors are placed at each end of the conveyor belt. The conveyor is rated at an operating speed of 13-60 feet per minute.



Little Giant dicing cutter

Taylor, Stiles Plastic Pelletizer

A 45-inch-wide dicing cutter that can pelletize sheet plastics at the rate of about 10,000 pounds an hour has been introduced by Taylor, Stiles & Co., Riegelsville, N. J. The machine is designed with circular knives and weighs 6,000 pounds.



KM-2 Hydraulic Press

Kingsbacher-Murphy Hydraulic Press

A hydraulic press for such uses as rubber and plastic molding, testing, and laminating, which features a two-stage hydraulic pump that automatically switches from low to high pressure, comes from Kingsbacher-Murphy Co., Hollywood, Calif. Designated KM-2, the press develops up to 40,000 pounds on the platens and has individual thermoswitches which permit temperature control up to 600° F. of the cast electric heaters in each of the platens. The frame is of all-steel welded design. The KM-2 is available in two-, three-, and four-platen models in both eight- by eight-inch and nine- by 12-inch platen sizes.

A special model is available with an electric pump, push-button or single lever control, and automatic timing and pressure regulator.

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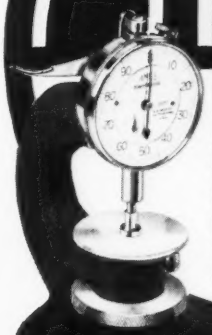

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0.97 approximately

Coagulum
0.5 max. retained in 60 mesh

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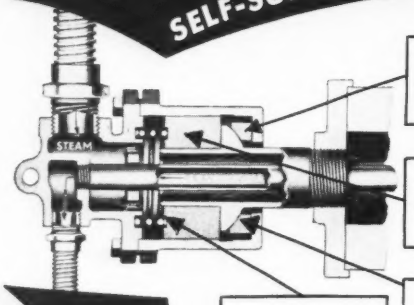

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Type SB shown handles both steam and condensate through same head; also available for through flow service, and in sizes and styles for all operating conditions. ***Write for literature.***

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NEW MATERIALS

Low-Temperature Synthetic Rubber Plasticizer

A low-temperature plasticizer for synthetic rubbers, Plastolein 9404 TGP (triethylene glycol dipelargonate), that is said to be an improvement over other triglycol esters and adipates by giving lower heat loss, less water sensitivity, and lower compression set, as well as equivalent low-temperature flexibility, has been made commercially available by Emery Industries, Inc., Cincinnati, O.

Formerly called Emery X-66-S while in the developmental stage, the plasticizer is said to be a fundamentally synthetic material which can be produced at consistent quality through the use of low-cost domestic raw materials.

Reported specifications include:

Saponification number	266
Specific gravity, @20° C.	0.965
Refractive index, @20° C.	1.4475
Average molecular weight	420
Flash point	410° F.
Fire point	470° F.
Viscosity (SUS @100° F.)	59
(210° F.)	35

Technical Bulletin No. 55, comparing the performance of Plastolein 9494 TGP with competitive plasticizers, in terms of a typical Hycar 1002 recipe, is available from the company.

Low-Temperature Curing Nitrex 2614

A nitrile latex that gives good adhesion to cellulose and can be vulcanized at low temperatures (as low as 140° F.) with zinc oxide and in the absence of sulfur or accelerators has been developed by Naugatuck Chemical Division of United States Rubber Co., Naugatuck, Conn. Called Nitrex 2614, the latex, as a vulcanized film, is said to show considerable resistance to oil and solvents, such as used in dry cleaning, and appears to have high affinity for color pigments and dyes.

Suggested applications for the latex include: binder for non-woven fabrics, adhesive to bind metal foil to paper, pigment binder for textiles to prevent color crocking, and as a backing for textile fabrics. When shipped with a separate container of zinc oxide paste, providing four parts zinc oxide to 100 parts of latex, the latex is coded Nitrex 2614-A.

Some reported general properties of Nitrex 2614 follow:

Total solids, %	38-40
pH	7–9
Viscosity	low
Stability	good
Particle size	small
Antioxidant	non-discoloring, non-staining
Film odor	none

New Polyisobutylene Dispersion

An aqueous dispersion of Enjay's Vistanex that yields a colorless, tacky film, when the moisture is removed, has been placed on the market by Miller-Stephenson Chemical Co., Inc., New York, N. Y. Called Polyisobutylene Dispersion 108, the milky white liquid is compatible with natural and synthetic latices, and films formed of it have high stability and chemical inertness,

(*Continued on page 436*)

NEW PRODUCTS

Fisk Air-borne Deluxe

Deep-Slotted Tubeless Tire

A tubeless tire with traction slots that extend through more than 80% of the tread depth, a feature that is said to maintain skid safety even when the tire is more than 60% worn, has been introduced by United States Rubber Co., New York, N. Y. Called Fisk Air-borne Deluxe, the tire is also claimed to give increased mileage and better blowout protection because of a special carcass construction; it contains an air-retaining synthetic rubber lining for improved puncture protection. The tire has a narrow white sidewall as well as a new shoulder design.

Gillette President Deluxe

A passenger-car tire claimed to maintain traction and skid resistance even when two-thirds worn also is being marketed by U. S. Rubber, Gillette tires division. Called Gillette President Deluxe, the tire is available in tubed or tubeless construction and with nylon or rayon cord. Sidewalls are optional. Safety slots extend almost the full length of the tread, giving the tire long-lived traction, the company states.

Mine Shuttle-Car Solid Tire

A demountable solid rubber tire for coal-mine shuttle cars that is said to have many advantages over pneumatic tires also comes from U. S. Rubber. This tire, U. S. Royal Mine Cushion, is said to be easier rolling than pneumatic tires, has double the longevity, and a 30-50% greater rated load capacity. The tire can also be used on bolting, drilling, cutting machines, and other miscellaneous equipment now mounted on pneumatic tires from sizes 500-16 through 900-15.

Goodyear Pile-Driver Hose

A new flexible pile-driver hose for the construction industry that is said to have greater longevity than similar products has been made available by The Goodyear Tire & Rubber Co., Akron, O. Called Flexsteel Pile-Driver Hose, it is equipped with heat-resistant tubes and covers and constructed of two braids of steel wire, with nylon breaker used over the second steel braid, according to the company. Sizes are ½, 2, and 2½ inches.

Lightweight Protective Goggles

One-ounce, one-piece protective goggles with acetate lenses and plastic frame and nosepiece have been introduced by General Scientific Equipment Co., Philadelphia, Pa. Available in clear or medium green lenses, the goggles are suitable for wearing

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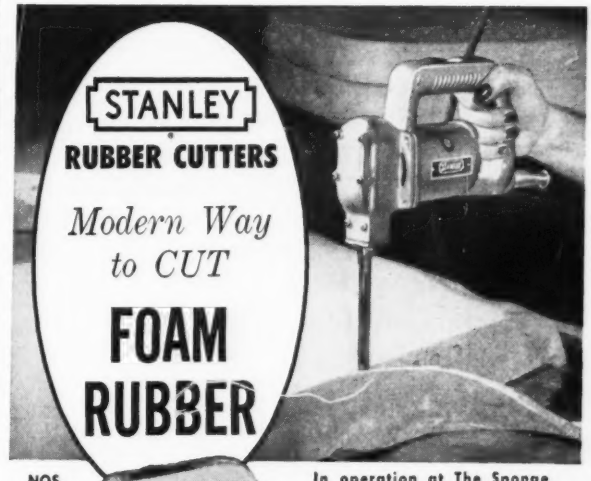

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over prescription glasses and are said to be ideal for such occupations as woodworking, grinding, and spot welding.

Goodrich Warm-N-Hot Bottle

Two-Temperature Hot Water Bottle

A rubber hot water bottle designed to give off heat 10° F. less on one side than on the other has been placed on the market by The B. F. Goodrich Co., sundries division, Akron, O. Dubbed Warm-N-Hot, the bottle has one side embossed with thin ribs that permit air circulation and a consequent lowering of temperature. According to the company, the cooler side offers immediate relief from the too-hot side, saves dumping and refilling with cooler water.

Dayton Tires for Higher Truck Loads

Two new truck tire sizes in its Thorobred line that are said to provide for increased loads without resort to higher or longer trailers have been introduced by The Dayton Rubber Co., Dayton, O. The sizes are 10.3-12 ply and 10.3-14 ply, which must be used on 7.5 rims to provide the necessary volume ot air.

The two tires give truckers the same carrying capacity as a 10.00-20 tire with about the same operating diameter as a 9.00-20, the company says. These new tires are particularly well-adapted to cab-over-engine front-wheel operations and to drive wheel and trailer applications which require additional clearance, yet carry the loads now being placed on 10.00-20 tires, according to Dayton.

Polyisobutylene Dispersion 108

(*Continued from page 434*)

resist aging and water absorption, and retain their flexibility at low temperatures, according to the company.

Suggested uses for Polyisobutylene Dispersion 108 include pressure-sensitive adhesives, tackifier and binder, protective coatings, sealing compounds, textile coatings and laminations, and as a binder for cellulose, textile, and leather fibers. The material has a pH of 10-11, an approximate specific gravity of 0.97, a medium viscosity, a coagulum of 0.5 maximum retained in 60 mesh, and an approximate solids content of 55%.

TECHNICAL BOOKS

BOOK REVIEWS

"Buna, Herstellung, Prüfung, Eigenschaften." W. Breuers and H. Luttropp. Published by VEB Verlag Technik, Berlin. 1954. Cloth, 7 by 9½ inches, 427 pages, illustrated.

Although Germany pioneered the actual production and use of synthetic rubber, particularly the Buna types, very little literature in book form has hitherto appeared on the subject in the German language. The present work is an attempt by the authors, both active at the Schkopau Buna works in East Germany, to fill this lack, and in this aim they have largely succeeded. Each of the three main parts of the book, headed, respectively, "Production and Properties of Unprocessed Buna," "Testing Methods for Buna," and "Compounds and Vulcanizates," discusses in numerous sections practically every aspect of the subjects indicated by these titles.

In Part I a brief history of the development of Buna is followed by a systematic treatment of production—from the monomers, through polymerization methods and the manufacture of the various types of Bunas and Perbunans in Germany, as well as of the GR-S rubber in America—and the properties of Buna.

In Part II—the longest and most complete section—practically every kind of chemical and physical testing method used in Germany and America for Buna-type rubbers (with a few Soviet and British tests added for good measure) finds a place, accompanied by numerous graphs, tables, and illustrations of apparatus and test results on samples.

The third and last part of this book covers the action of various compounding ingredients, processing and—in greater detail—fillers and the comparative properties of different natural rubber and Buna compounds, as well as the results obtained by mixing Buna S3, S4, and 85 with natural rubber. Various German carbon blacks and one Rumanian black, are described, and the effects of increasing amounts added to Buna are shown in several graphs and tables; other tables show how these blacks compare with Philblack 0, and still another series indicates the action of white fillers.

The book is fully documented—every sub-section closes with a list of references, some of hitherto unpublished material; many patents are also mentioned. Good indices of authors and subjects conclude a book that should prove a valuable source work for all interested in the Buna-type synthetic rubbers.

"Hawley's Technical Speller." Gessner G. and Alice W. Hawley. Reinhold Publishing Corp., New York, N. Y. Cloth, 5 by 7½ inches, 146 pages. Price, $2.95.

This small volume is a compilation of more than 8,000 technical words selected from the vocabularies of chemistry, physics, engineering, and the other sciences. The words are arranged alphabetically with syllabic divisions, but remain undefined. A brief explanation of the derivation of chemical terminology is included. The specialist, with his basic background and his own reference books, will not find this speller too helpful in his work. But others on the fringes of a technical vocation, such as secretaries, teachers, and authors, will.

NEW PUBLICATIONS

"Dow Corning Silicone Mold Lubricants." Dow Corning Corp., Midland, Mich. 8 pages. Advantages and applications of the company's mold release agents are given in this illustrated booklet.

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VA-7 is a new liquid vulcanizing agent for all types of unsaturated elastomers. It provides economical "sulfurless" cures for nitrile, GR-S and natural rubber stocks.

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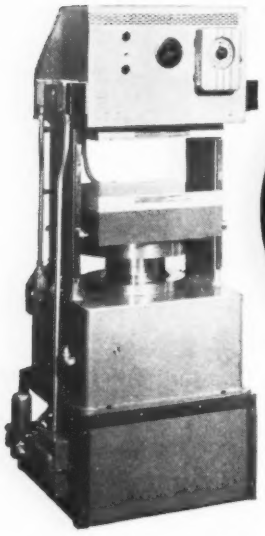

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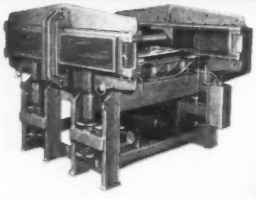

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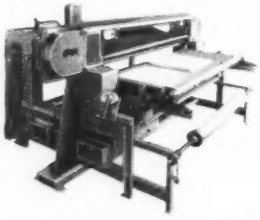

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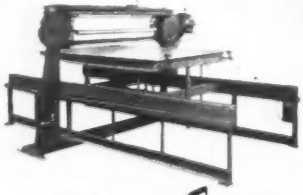

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Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.:

"Neoprene Notebook." No. 65, August, 1955. 8 pages. This issue of the Notebook features brief articles on weathering and sunlight resistance (Part XII of The Language of Rubber); a new belt design, better soling and cart wheels, farm hoses, an improved trailer hitch ("fifth wheel"); and the Navy's new inflatable life boats.

"Neoprene Types WRT and WHV for Better Cement Dipped Gloves." J. C. Carl. Report BL-298. 3 pages. A typical recipe, method of fabrication, and physical properties after curing of a blend of Neoprene Types WRT and WHV for cement dipped gloves, a composition said to resist stiffening in cold weather as Type GN, formerly used, sometimes does, are presented in this publication.

"Hypalon 20." M. A. Smook, P. V. Fullam, W. J. Remington. Report No. 55-5. 12 pages. Reported here is a comparison of the processing characteristics of Hypalon and Hypalon 20, both chemically the same. The newer Hypalon 20, however, is said to have such improved processing characteristics as better building tack, less nerve, and lower Mooney viscosity.

"Neoprene Latex Type 60." R. O. Becker. Report BL-299. 4 pages. The physical properties, test data after curing, and sample recipes of Neoprene Latex Type 60, used to produce molded foam with good flame-retarding characteristics, are contained in this technical report.

"Control of Lead Press Discoloration in Neoprene." D. C. Thompson and R. W. Murray. Report BL-300. 2 pages. The avoidance of darkening lead sulfide formation in the production of light-colored neoprene hose covers through the use of such accelerators as Retardex W or combinations of NA-22 and cadmium stearate is discussed here.

"Activation of Unicel ND in Blown Elastomer Sponge." D. H. Lutz. Report BL-301. 4 pages. The activation of the blowing agent Unicel ND in the production of odorless natural rubber, GR-S, or neoprene blown sponge by using a combination of Aquarex NS and urea is the subject of this report. Sample recipes are included.

Publications of Naugatuck Chemical, division of United States Rubber Co., Naugatuck, Conn.:

"Celogen." R. R. Barnhart. Compounding Research Report No. 36. 16 pages. This illustrated booklet presents the composition, nature, properties, processing, and uses of Celogen, a nitrogen blowing agent for sponge rubber and expanded plastics. Formulations for various applications are also included.

"Celogen-AZ." R. R. Barnhart. Compounding Research Report No. 38. 16 pages. Celogen-AZ is a fine yellow powder with a specific gravity of 1.63; while Celogen is a fine white crystalline powder with a specific gravity of 1.52. Other properties, uses, promoters, processing, etc. for Celogen-AZ appear in this profusely illustrated bulletin.

"Paracril Nitrile Rubbers—Compounding and Processing with Carbon Black and Non-Black Pigments." W. E. Galwardy. Technical Bulletin No. 7 (Revised). 102 pages. This book is a detailed discussion of the use of carbon black and non-black pigments in the compounding of Paracril B, C, and AJ and includes recipes, curing systems, and physical properties of the compounds after curing.

"Marvinol VR-30." Bulletin No. 2. 8 pages. The physical properties, compounding, and processing of Marvinol VR-30, a straight polyvinyl chloride resin designed for calendering operations, are given in this illustrated booklet.

Publications of The B. F. Goodrich Co. Industrial Products Division, Akron, O.:

"B. F. Goodrich Water Hose." Bulletin 4800. 2 pages. Specifications and applications of the firm's water hose are given in this illustrated data sheet.

"B. F. Goodrich Hose Couplings and Fittings." 4 pages. Illustrated and described with specifications are many of the firm's hose couplings and fittings.

"Silco-Flex Insulation." Bulletin 05R8341. Allis-Chalmers Mfg. Co., Milwaukee, Wis. 4 pages. The advantages of an all-silicone-rubber insulating system for motor and generator stator windings are put forward in this reprinted article.

"Chemical Magnesias and Magnesite." General Magnesite & Magnesia Co., Norristown, Pa. 8 pages. The specifications and applications of the firm's magnesias are reported in this booklet.

"Synvar Resorcinol Resins." Synvar Corp., Wilmington, Del. 16 pages. Specifications and applications of the firm's Synvaren PLS resins, including their use as adhesives for fiber glass and rubber, for RFL treatment of rayon and nylon, and for bonding wood and non-wood materials, are covered.

"Solvent Recovery by the Columbia Activated Carbon System." Form 4410D. Carbide & Carbon Chemicals Co., New York, N. Y. 36 pages. Activated carbon and its use in the industrial recovery of a variety of solvents is the subject of this booklet.

"Dies and Machines." Western Supplies Co., St. Louis, Mo. 8 pages. Photographs and descriptions of the firm's dies and machines for cutting, perforating, flash trimming, and electronic sealing in the rubber and plastics industries are included in this catalog.

"Barco Flexible Ball Joints for Piping." Catalog No. 215-B. Barco Mfg. Co., Barrington, Ill. 20 pages. Specifications and schematic drawings of the firm's flexible ball, swing, swivel, revolving, and other typs of movable joints for use in piping for power, process, heating, chemical, construction, or hydraulic service are contained in this catalog, together with photographs of this equipment in industrial operation.

"Equipment News." Bulletin No. 53-R-544. Farrel-Birmingham Co., Inc., Ansonia, Conn. 4 pages. Two production systems, one employing a Banbury mixer over an extruder for the processing of plastics in preparation for granulation, the other for the pelletizing and slabbing of rubber in which processing and handling are fully automatic, are described and diagrammed in this publication.

"Rubber Insulated Metal Parts." Automotive Rubber Co., Inc., Detroit, Mich. 4 pages. Illustrations and specifications of the company's rubber insulated metal parts are given in this folder.

"How to Achieve Dust Free Processing of Rubber and Plastic Powders." Bulletin No. 555-D. Wheelabrator Corp., Mishawaka, Ind. 4 pages. Four case histories recounting the achievement of dust control in rubber and plastic processing through the use of the company's equipment are contained in this publication.

"Rubarite." Rubarite, Inc., Chicago, Ill. 16 pages. The properties, advantages, and methods of applications of Rubarite, a paving material made of unvulcanized synthetic rubber latex and barytes, are presented in this illustrated brochure, together with performance data of various paving projects in which Rubarite was used.

"Fielden Proximity Meter Capacitance Gauge." TM-951-1. Robertshaw-Fulton Controls Co., Fielden Instrument Division, Philadelphia, Pa. 28 pages. The firm's proximity meter for measuring electronically minute variations in capacitance without touching the specimen is described, and its applications are outlined in this technical booklet.

"Dytol Fatty Alcohols." Rohm & Haas Co., Philadelphia, Pa. 2 pages. Properties, specifications, and suggested uses of five of the firm's fatty alcohol are contained on these data sheets.

"Flow-Master Continuous Reactor and Mixing Assemblies." Bulletin No. 287. Marco Co., Inc., Saginaw, Mich. 4 pages. The firm's small pilot plant assemblies for such continuous reactions as alkylation, polymerizations and copolymerizations, acetylations, and sulfonation are here described and pictured.

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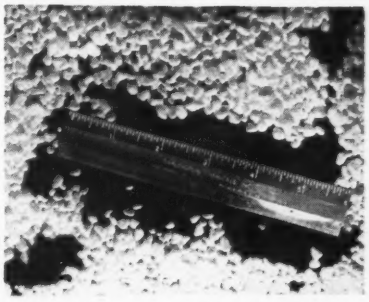

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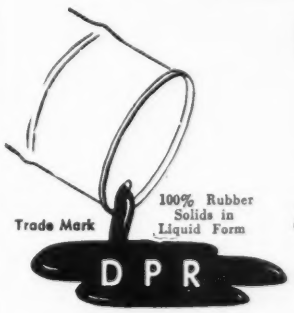

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MARKET REVIEWS

Natural Rubber

The natural rubber price pendulum, always in motion, described one full swing during the period from October 16 to November 15. Prices near mid-period had fallen to the levels of early July, but a swift recovery was staged so that at period's end all losses had been made up, with even a small gain being registered. Subsequent indications made it clear that prices were again on the upgrade. Trading on the New York Commodity Exchange was expectedly heavy.

The market's behavior was independent of external factors. There were, in fact, few political or economic stimuli that could be noted in the days' news, certainly none that could account for the seemingly meaningful pattern of the price swing.

The bullish estimated consumption figures released by the International Rubber Study Group, although welcomed in many quarters, had no apparent effect on the market. What influence supply-and-demand and speculation were having on the market was too subtle to be detected. It would all be provokingly mysterious if it had not happened before.

Statistically, on the New York Commodity Exchange sales for the second half of October were 31,210 tons, bringing the monthly total to 63,450 tons. Sales during the first half of November were 41,090 tons; 72,300 tons for the period.

Near-December stocks began the period at 41.95¢, and was 44.20¢ on November 15. Far-December stocks moved from 34.30¢ to 36¢.

COMMODITY EXCHANGE
WEEK-END CLOSING PRICES

Futures 1955	Sept. 24	Oct. 22	Oct. 29	Nov. 5	Nov. 12
Dec.	48.35	41.80	42.40	40.25	43.50
1956					
Mar.	46.10	39.35	40.30	38.30	40.90
May	44.95	38.00	38.80	37.25	39.50
July	43.75	36.80	37.55	36.25	38.45
Sept.	42.60	35.55	36.45	35.25	37.35
Dec.	41.40	34.50	35.35	34.30	36.55
Total weekly sales, tons	12,570	17,470	11,140	22,300	11,820

NEW YORK SPOT MARKET
WEEK-END CLOSING PRICES

	Sept. 24	Oct. 22	Oct. 29	Nov. 5	Nov. 12
R.S.S.: #1	49.13	43.50	44.00	40.50	44.50
2	48.88	43.25	43.75	40.25	44.25
3	48.50	43.00	43.50	40.00	44.00
Latex Crepe #1 Thick	50.38	45.50	46.00	43.75	46.88
Thin	50.38	45.50	46.00	43.75	46.88
#3 Amber Blankets	37.88	35.25	34.88	34.50	35.25
Thin Brown Crepe	37.50	34.75	34.38	33.75	34.75
Flat Bark	36.00	31.00	31.00	30.00	30.00

On the physical market, R.S.S. #1 began the period at 43.75¢, fell to a low of 39.50¢ on November 2 and 3, then rose rapidly to a period high of 45.75¢ by November 14.

October monthly average spot prices for representative grades were as follows: R.S.S. #1, 44.53¢; R.S.S. #3, 44.01¢; #3 Amber Blankets, 35.95¢; and Flat Bark, 31.52¢. For the first half of November, R.S.S. #1 averaged 41.99¢.

Synthetic Rubber

Still in its infancy, the American synthetic rubber industry is already showing signs of phenomenal prosperity. According to The Rubber Manufacturers Association, Inc., 88,113 long tons of synthetic rubber were produced in this country during October, a sizable increase over the 83,507 long tons produced the month before. This is a record high, but it is expected to be only one of a long-continuing series of growth increments. Primarily responsible for the October figure was the substantial boost of GR-S production during the month, an estimated 72,480 long tons having been turned out, against 67,658 long tons for September.

Exports were also on the upswing. For the first nine months of the year, 57,913 long tons of all types of synthetic rubber were shipped abroad. September exports were 9,117 long tons. Both figures were the highest since the end of World War II: during this war the American government had sent large quantities of synthetic rubber to its allies to replace the nearly non-available natural product.

Export prices of synthetic also seem to be moving up. Several GR-S producers have hiked their export prices to 26¢ a pound, f.a.s., New York, which is equivalent to a rise of about 1½¢ over the base price of 23¢ a pound, f.o.b., producing plant. Additional price increases may also result from the anticipated crude petroleum price boost of about 20%, due in January, since butadiene supplies are tight. This rise, however, may be offset by the expansion programs of several butadiene producing plants currently under way. Also, the huge Institute, W. Va., facility, to produce GR-S, should be in operation by mid-1956.

But it is expected that rising synthetic production in this country will make for domestic price stability. A plea for such stability through increased production was voiced by several speakers at the recent RMA annual meeting. It was pointed out that world demand for rubber would reach 3,500,000 long tons by 1960, a figure that only the synthetic product could help attain. Synthetic production would have to be about 1,950,000 long tons in 1960 to meet this demand. The 1956 production level was expected to be 1,315,000 long tons.

No one at the meeting disputed this reasoning, or that American producers could meet the challenge. It was felt that the substantial pressures acting to force synthetic prices up would be counteracted by growing production.

Latex

Activity in *Hevea* and synthetic latices during the period from October 16 to November 15 subsided somewhat from the level of the previous period. Trading in the natural latex, particularly, was under par, as prices, tied to R.S.S., proved too erratic for consumers to step in and cover their requirements. Observers thought stocks were running low, both in the natural and GR-S products.

Prices for ASTM Centrifuged Concentrated latex fell during the period, ranging, in tank-car quantities, f.o.b. rail tank cars, from 47 to 52¢ per pound solids. Synthetic latices remained static: GR-S, 26-32.3¢; neoprene, 37-47¢; and N-type, 46-54¢.

Final August and preliminary September domestic statistics for all latices follow:

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
Aug.	0	8,805	6,784	11,962
Sept.	0	....	7,572	12,649
GR-S				
Aug.	4,379	77	4,514	6,201
Sept.	5,657	41	5,605	6,348
Neoprene				
Aug.	881	0	770	885
Sept.	994	0	789	918
Nitrile				
Aug.	917	0	810	1,319
Sept.	1,086	0	884	1,502

Scrap Rubber

Activity on the scrap rubber market during the period from October 16 to November 15 was fairly quiet, a considerable change from the brisk business which characterized last month's market. Suppliers did some filling of old commitments, including shipment orders for Naugatuck. Naugatuck, again struck by flood waters, was taking in scrap mostly by truck, since rail service was limited.

According to the Bureau of the Census, United States Department of Commerce, July exports were 2,606,250 pounds, valued at $108,767, compared with June's 3,481,721 pounds, worth $92,446. In order of volume, Spain, France, the Netherlands, Canada, and West Germany were the chief receivers of export scrap during July.

Imports of scrap rubber in July totaled 1,716,873 pounds, valued at $73,822, against 1,721,233 pounds, worth $97,426, in June.

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- In High Styrene Compounds—to lower costs by reducing significantly the quantity of high styrene resin without lowering physicals;
- In MOLDED GOODS—for easy processing, good mold flow, excellent detail, and reduced shrinkage;
- In Calendered Goods—for easy processing, fine surface finish and faithful retention of embossed details;
- In Heel, Sole and Slab Stocks—to impart good physicals and easy processing properties to highly loaded stocks.

If your problem is among these, you owe it to yourself to try POLYMEL DX at once. Available in powder or 2" lump form, we will be glad to send a generous sample on request.

Prices fob Baltimore		
	1 drum to 4900 lbs.	—.1475¢ lb.
	5000 lbs. to truckloads	—.1425¢ lb.
	Truckloads	—.1375¢ lb.

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Fractional price decreases of ¼-½¢ were noted for all synthetic-free grades. Period-end prices follow.

	Eastern Points Akron, O. (Per Net Ton)	
Mixed auto tires	$12.00/15.00	$15.00/16.00
S. A. G. auto tires	Nom.	13.00
Truck tires	Nom.	14.00
Peelings, No. 1	41.00/42.00	41.00/42.00
2	23.00	24.00
3	15.50	Nom.
Tire buffing	17.00	14.00/15.00
	(¢ per Lb.)	
Auto tubes, mixed	4.50	4.50
Black	5.50	5.50
Red	6.50	6.50
Butyl	6.25/6.50	6.25/6.50

Reclaimed Rubber

Activity in the reclaimed rubber market during the period from October 16 to November 15 continued strong, with all signs pointing to the maintenance of this high level for the period ahead. Chief cause of this strength was a booming automotive production, which led one company executive to say that business may improve even further.

According to the Bureau of the Census, United States Department of Commerce, exports of reclaimed rubber in July declined to 2,527,471 pounds, valued at $233,992, from 2,634,434 pounds, worth $242,041, in June. Imports increased sharply in July; arrivals totaled 201,600 pounds, value $21,280, compared with the June total of only 56,000 pounds, worth $6,956.

Prices, according to reports, remained the same as for last month.

RECLAIMED RUBBER PRICES

	Lb.
Whole tire: first line	$0.105
Fourth line	.0925
Inner tube: black	.15
Red	.21
Butyl	.16
Pure gum, light colored	.23
Mechanical, light colored	.135

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Cotton Fabrics

Trading continued active on the industrial fabrics market during the period from October 16 to November 15, causing some price increases and the accumulation of a substantial backlog of orders. A tight supply situation was seen on most heavy goods for the balance of this year, and observers freely predict that the industrial cloth market would remain strong even if the pace of current buying should abate.

Especially in demand were wide goods, including wide drills, sateens, and sheetings, as they have been during the past several weeks. All types of ducks were also ordered in good volume, with substantial quantities of Army ducks, numbered and flat ducks selling into the first quarter.

Price increases over the period included 1¢ boosts for 59-inch, 2.25-yd. drills; and for 58-inch, 1.21-yd. sateens. Fractional increases were noted elsewhere. Period-end prices follow.

COTTON FABRICS

Drills		
59-inch 1.85 yd.	*yd.*	$0.40
2.25-yd.		.345
Ducks		
38-inch 1.78-yd. S.F.	*yd.*	nom.
2.00-yd. D.F.		.31
51.5-inch, 1.35-yd. D.F.		.4675
Hose and belting		.67
Raincoat Fabrics		
Printcloth, 38½-inch, 64x60, 5.35-yd.	*yd.*	.1425
6.25 yd.		.12
Sheeting, 48-inch, 4.17-yd.		.20
52-inch, 3.85-yd.		.235
Osnaburgs		
40-inch 2.11-yd.	*yd.*	.2625
3.65-yd.		.165
Chafer Fabrics		
14.40-oz./sq. yd. Pl.	*yd.*	.70
11.65-oz./sq. yd. S.		.61
10.80-oz./sq. yd. S.		.6575
8.9-oz./sq. yd. S.		.67
Other Fabrics		
Headlining, 59-inch, 1.65-yd., 2-ply	*yd.*	.47
64-inch, 1.25-yd., 2-ply		.595
Sateens, 53-inch, 1.32-yd.		.56
58-inch, 1.21-yd.		.62

Rayon

Total calculated production of rayon and acetate yarn during October was 73,000,000 pounds, of which 35,300,000 pounds were regular-tenacity yarn and 37,700,000 were rayon high-tenacity yarn. September production had been 74,100,000 pounds, total; 36,000,000 pounds regular-tenacity yarn; and 38,100,000 pounds rayon high-tenacity yarn.

Total shipment for October was 72,100,000 pounds, consisting of 34,900,000 pounds regular-tenacity yarn and 37,200,000 pounds rayon high-tenacity yarn. September shipments had been 71,300,000 pounds, total; 33,100,000 pounds regular-tenacity yarn; and 38,200,000 pounds rayon high-tenacity yarn.

End-of-October stocks follow: total yarn, 48,600,000 pounds; regular-tenacity, 42,900,000 pounds; and rayon high-tenacity, 5,700,000 pounds. End-of-September were: total yarn, 47,700,000 pounds; regular-tenacity, 42,500,000 pounds; and rayon high-tenacity, 5,200,000 pounds.

According to the Bureau of the Census, United States Department of Commerce, tire cord and, tire fabric production decreased 2% during the third quarter of this year, compared to that of the previous quarter. However, total production of 131,695,000 pounds, of which 102,705,000 pounds were rayon tire cord and tire cord fabric, was 62% above the level of the third quarter of 1954.

Prices per pound of rayon tire yarns and fabrics remained unchanged, as follows:

RAYON PRICES

Tire Yarns	
High-Tenacity	
1100/ 480	$0.62
1100/ 490	.62
1150/ 490	.62
1165/ 480	.63
1230/ 490	.62
1650/ 720	.61
1650/ 980	.61
1875/ 980	.61
2200/ 960	.60
2200/ 980	.60
2200/1466	.67
4400/2934	.63
Super-High-Tenacity	
1650/ 720	.64
1900/ 720	.64
Tire Fabrics	
1100/490/2	.72
1650/980/2	.695 / $0.73
2200/980/2	.685

Financial

(*Continued from page 426*)

Parker Appliance Co., Cleveland, O. Quarter ended September 30, 1955: net loss, $13,646, contrasted with net profit of $268,490 in the 1954 quarter.

Sun Chemical Corp., Philadelphia, Pa. First nine months, 1955: net earnings, $1,289,983, equal to $1.02 a share, compared with $1,121,503, or 88c a share, a year earlier.

Taylor Instrument Cos., Rochester, N. Y. Year ended July 31, 1955: net income, $1,190,690, equal to $6.30 a share, compared with $1,265,901, or $6.70 a share, in the preceding fiscal year.

Timken Roller Bearing Co., Canton, O. Nine months to September 30, 1955: net profit, $16,216,176, equal to $6.70 each on 2,421,380 capital shares, contrasted with $7,410,388, or $3.06 a share, a year earlier.

Malaya

(*Continued from page 430*)

when they retire, a future independent government in Malaya may have passed laws preventing them from taking home their life savings or depreciating their value, as has already happened in the East. These planters want some statement from the Federation Government so that they can make plans. *The Planter,* the I.S.P. journal, in discussing this question, referred to the Ceylon Government which has stated its policy of allowing sterling area nationals to transfer freely to their homeland all their proved assets when they leave Ceylon on retirement, and declared that while European planters in Malaya do not wish to suggest that the Malayan Government would be less liberal than Ceylon, yet it would "resolve the doubts of not a few planters if the Malayan Government were to make known its policies which will affect them."

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STATISTICS of the RUBBER INDUSTRY

U.S.A. Imports and Production of Natural (Including Latex and Guayule) and Synthetic Rubber (in Long Tons)

Year	Natural	GR-S	S-Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1947	688,354	405,496	3,362	62,824	31,495	6,618	1,198,149
1948	735,227	390,240	15,252	56,662	34,848	7,012	1,239,241
1949	660,792	288,882	21,717	54,046	35,215	11,072	1,071,724
1950	802,249	350,801	28,086	60,915	50,067	12,037	1,304,155
1951	733,048	694,583	9,946	76,475	58,907	15,333	1,588,292
1952	805,997	636,969	17,885	81,630	65,745	16,228	1,624,454
1953	647,615	668,386	12,342	79,801	80,495	20,198	1,508,837
1954							
Jan.	47,170	43,524	853	5,539	6,513	1,620	105,219
Feb.	42,645	40,661	1,030	4,801	6,206	1,574	96,917
Mar.	47,721	43,372	1,092	5,214	5,190	1,900	104,489
Apr.	49,855	34,384	1,167	6,004	5,601	1,645	98,656
May	55,983	35,117	1,120	4,581	4,828	1,960	103,589
June	66,698	35,829	1,263	3,182	5,101	1,696	113,769
July	40,614	35,415	1,388	4,960	4,673	1,814	88,864
Aug.	59,124	36,843	1,803	5,003	5,313	1,624	109,710
Sept.	48,618	38,937	2,183	4,675	6,036	1,718	102,167
Oct.	49,432	42,000	1,938	5,117	6,644	1,864	106,995
Nov.	45,474	41,109	2,021	5,060	6,839	1,913	102,416
Dec.	43,557	45,507	1,849	4,666	6,206	2,068	103,853
Total	596,848	472,698	17,707	58,802	69,150	21,396	1,236,601
1955							
Jan.	49,941	57,607	1,436	3,220	6,983	2,099	121,286
Feb.	50,880	55,293	1,149	3,727	6,910	1,729	119,688
Mar.	61,250	63,940	1,229	5,256	7,132	2,158	140,965
Apr.	61,113	50,745	10,081	5,148	8,359	2,534	137,980
May	61,042	3,592	63,235	5,115	7,852	3,122	143,958
June	52,762	3,739	61,658	3,872	5,919	3,850	131,800
July	43,626	1,640	64,863	5,395	6,904	3,700	126,128
Aug.	59,840	....	68,835	4,203	8,511	3,224	144,613
Sept.*	....	....	68,246	5,097	7,677	3,142	....

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

U.S.A. Consumption of Natural (Including Latex) and Synthetic Rubber (Long Tons)

Year	Natural	GR-S	S-Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1947	562,661	446,316	2,273	68,838	37,703	4,536	1,122,327
1948	627,332	334,233	11,080	58,870	32,118	5,771	1,069,404
1949	574,522	299,420	21,717	52,664	31,753	8,827	988,903
1950	720,268	388,427	27,803	66,348	43,781	11,930	1,258,557
1951	454,015	617,200	9,244	70,500	48,887	13,066	1,212,912
1952	453,846	648,816	17,604	71,229	55,522	13,866	1,260,883
1953	553,473	611,748	12,433	77,826	65,900	16,929	1,338,309
1954							
Jan.	46,960	37,707	982	5,438	4,774	1,272	97,133
Feb.	46,897	36,765	942	5,696	4,467	1,190	95,957
Mar.	53,709	42,074	1,062	6,300	5,177	1,447	109,769
Apr.	51,451	40,194	1,130	6,241	4,684	1,395	105,105
May	51,398	40,030	1,144	5,602	4,486	1,366	104,026
June	54,253	43,782	1,192	5,961	4,769	1,491	111,448
July	37,894	31,474	1,326	4,108	3,499	1,145	79,446
Aug.	38,069	30,800	1,596	3,569	4,647	1,439	80,120
Sept.	52,412	40,204	1,994	5,138	5,049	1,493	106,290
Oct.	55,970	45,002	2,061	4,711	4,931	1,604	114,279
Nov.	53,326	44,429	1,980	3,967	5,276	1,635	110,613
Dec.	55,096	50,540	1,935	4,583	5,434	1,638	119,226
Yr.-end adj.	− 1,150	....	....	+ 150	....	+ 600	....
Total	596,285	483,001	17,344	61,464	57,203	17,715	1,233,412
1955							
Jan.	56,911	54,728	1,643	4,478	5,676	1,854	125,290
Feb.	50,997	54,707	1,293	4,312	5,476	1,826	118,611
Mar.	58,472	62,548	1,189	4,839	6,423	2,119	135,590
Apr.	52,963	54,091	5,655	4,321	5,884	2,145	125,059
May	54,746	2,533	60,325	4,455	6,143	2,273	130,475
June	56,282	3,666	62,226	4,704	6,320	3,266	136,464
July	46,166	2,690	50,398	3,894	4,294	2,056	109,498
Aug.	48,359	....	59,746	4,307	6,450	2,841	121,703
Sept.*	51,175	....	63,450	4,547	6,225	3,031	128,428

* Preliminary.
Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.

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U.S.A. Stocks of Latex

(Long Tons, Dry Weight)

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1942	13.450	....	....	....	....	13,450
1943	3,638	....	....	....	....	5,638
1944	2,443	....	....	....	....	2,443
1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954						
Jan.	12,375	5,001	1,019	703	6,723	19,098
Feb.	13,963	5,269	963	625	6,857	19,820
Mar.	11,870	5,247	975	588	6,810	18,680
Apr.	10,803	5,273	1,062	600	6,935	17,738
May	8,907	5,180	1,110	655	6,945	15,852
June	9,460	5,591	1,020	646	7,257	16,717
July	10,171	5,363	1,004	831	7,198	17,369
Aug.	12,009	4,220	1,019	993	6,232	18,241
Sept.	11,546	4,504	984	908	6,396	17,942
Oct.	10,952	4,745	1,001	950	6,696	17,648
Nov.	9,759	4,943	1,055	939	6,937	16,696
Dec.	11,133	5,134	1,087	811	7,032	18,165
1955						
Jan.	9,684	5,861	1,067	812	7,740	17,424
Feb.	8,619	5,753	879	663	7,295	15,914
Mar.	7,820	6,940	909	637	8,486	16,306
Apr.	6,790	7,098	786	823	8,707	15,377
May	8,854	7,021	767	853	8.641	17,459
June	9,788	6,645	817	1,215	8,677	18,133
July	11,934	6,950	850	1,397	9,197	20,779
Aug.	11,962	6,201	885	1,319	8,405	20,367
Sept.*	12,649	6,348	918	1,502	8,768	21,417

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Preliminary.

U.S.A. Imports and Production of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1945	4,768	15,176	7,077	....	22,253	27,021
1946	8,012	24,810	13,595	....	38,405	46,417
1947	17,675	22,474	6,089	....	28,563	46,238
1948	32,630	21,494	5,022	....	26,516	59,146
1949	29,974	21,357	3,651	....	25,008	54,982
1950	54,401	31,339	5,725	....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954						
Jan.	5,396	4,089	592	471	5,152	10,548
Feb.	5,681	3,928	742	375	5,045	10,726
Mar.	5,682	4,142	709	483	5,334	11,016
Apr.	5,663	4,046	803	461	5,310	10,973
May	3,806	3,839	680	623	5,142	8,940
June	6,590	4,019	620	585	5,224	11,814
July	5,181	2,589	448	643	3,680	8,861
Aug.	7,571	1,995	756	682	3,433	11,004
Sept.	6,480	4,190	676	581	5,447	11,927
Oct.	7,210	5,190	742	780	6,712	13,922
Nov.	6,335	5,115	717	558	6,390	12,725
Dec.	8,888	5,238	729	624	6,591	15,479
Total	74,483	48,379	8,214	6,866	63,459	137,942
1955						
Jan.	7,853	6,199	617	624	7,440	15,293
Feb.	6,110	5,634	797	641	7,072	13,182
Mar.	7,611	7,078	854	672	8,604	16,215
Apr.	8,550	5,680	975	1,022	7,677	16,227
May	8,849	5,292	880	808	6,980	15,829
June	7,736	4,688	905	1,434	7,027	14,763
July	8,702	4,753	641	993	6,387	15,089
Aug.	8,885	4,456	881	917	6,254	15,139
Sept.*	....	5,698	994	1,086	7,778	....

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Preliminary.

U.S.A. Stocks of Synthetic Rubber

(Long Tons)

Year	S-Types	Butyl	Neoprene	N-Type	Total
1942	1,050	4	1,786	1,172	4,012
1943	36,395	1,033	6,644	3,223	47,295
1944	122,412	9,992	12,262	5,366	150,032
1945	170,571	18,378	9,703	4,802	203,454
1946	83,090	19,478	10,470	3,755	116,793
1947	40,606	13,184	5,237	3,339	62,366
1948	96,304	10,995	5,072	2,762	115,133
1949	77,743	12,224	4,654	3,433	98,054
1950	36,942	7,243	5,733	2,840	52,758
1951	105,271	12,481	8,379	3,821	129,952
1952	83,861	22,716	8,535	3,875	118,987
1953	135,153	24,866	11,480	4,346	175,845
1954					
Jan.	138,692	24,733	13,065	4,349	180,839
Feb.	143,202	23,573	12,518	4,112	183,405
Mar.	145,178	22,329	12,575	4,202	184,284
Apr.	136,446	21,673	12,665	4,199	174,983
May	131,604	20,077	11,467	4,435	167,583
June	124,678	17,534	10,646	4,314	157,172
July	128,752	18,150	11,315	4,727	162,944
Aug.	135,164	19,672	10,710	4,613	170,159
Sept.	128,313	18,513	10,288	4,548	161,662
Oct.	127,204	18,653	11,038	4,272	161,167
Nov.	121,772	19,338	11,429	4,366	156,905
Dec.	115,499	19,267	11,349	4,280	150,395
1955					
Jan.	114,976	17,079	11,598	4,160	147,813
Feb.	111,796	15,424	10,555	3,885	141,660
Mar.	113,594	15,096	11,037	3,786	143,513
Apr.	112,156	14,813	10,863	3,706	141,538
May	114,216	14,449	10,283	4,161	143,109
June	108,679	13,053	9,755	4,356	135,843
July	115,116	13,288	11,213	5,528	145,145
Aug.	113,046	12,395	11,326	5,525	142,292
Sept.*	112,838	12,233	11,019	5,207	141,297

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Preliminary.

U.S.A. New Supply, Consumption, Exports, and Stock of Reclaimed Rubber

(Long Tons)

Year	New Supply	Consumption	Exports	Stocks
1945	243,309	241,036	13,413	28,155
1946	295,612	275,410	14,461	33,666
1947	291,395	288,395	14,556	35,943
1948	266,861	261,113	11,428	32,630
1949	224,029	222,679	10,367	28,263
1950	314,008	303,733	11,740	35,708
1951	366,700	346,121	14,722	45,082
1952	274,981	280,002	11,180	30,664
1953	298,336	285,050	11,397	32,319
1954				
Jan.	20,026	19,114	912	31,865
Feb.	21,122	19,461	941	32,393
Mar.	23,383	22,882	830	32,148
Apr.	21,658	21,883	1,050	31,359
May	21,316	20,436	1,071	31,105
June	22,342	22,321	1,068	30,845
July	18,041	16,301	586	31,304
Aug.	15,519	17,660	647	27,692
Sept.	22,352	19,926	641	29,632
Oct.	23,566	22,098	808	30,395
Nov.	22,986	22,321	862	29,451
Dec.	25,790	24,546	816	30,746
Total	258,101	249,049	10,232	....
1955				
Jan.	25,336	25,322	1,041	29,656
Feb.	25,444	24,333	1,085	30,125
Mar.	29,574	28,674	1,088	30,311
Apr.	26,817	26,609	1,088	30,068
May	27,911	27,652	1,056	29,528
June	30,451	29.157	1.128	29,725
July	24,114	22,563	1,176	29,939
Aug.	25,223	25,790	1,144	27,956
Sept.*	26,437	26,444	1,160	27,056

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Preliminary.

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1. Graduate coating chemist acquainted with the formulation of coatings, familiar with coating techniques and the operation of various types of coating equipment. Background should include Vinylite and Neoprene coatings.

2. Graduate chemist with considerable experience in the development and utilization of phenol-aldehyde resins.

Positions will include research and development work. Location—N.J. Please send complete information of age, experience and education to

BOX NO. 1817, c/o RUBBER WORLD

RUBBER CHEMISTS

Degree in chemistry or chemical engineering. Up to five years' experience in rubber and polymer processing, development or production. Progressive company, well-equipped laboratory; permanent position with opportunity for advancement in expanding operation. Write giving age, experience, and education. Replies held confidential. Address Box 369, Erie, Pennsylvania.

WANTED

MANUFACTURER'S AGENT for line of Neoprene and Hypalon protective coatings. Eastern seaboard and midwestern states. Address Box 1818, care of RUBBER WORLD.

MAINTENANCE ENGINEER FOR PLASTIC CALENDERS, mills, Banbury. Must be experienced. Address Box No. 1819, care of RUBBER WORLD.

CHIEF LATEX CHEMIST TO DIRECT SOUTHERN MANUfacturing division of latex compounds for textile industry. Must be tops on compound experience and development. Excellent opportunity in established growing concern. State fully qualifications and requirements. Address Box No. 1820, care of RUBBER WORLD.

RUBBER CHEMISTS

A fast-growing and progressive organization in the Midwest has opportunities for experienced graduate chemists and chemical engineers in resin and rubber adhesive coatings. Assignments include product development of pressure-sensitive tapes in a modern and well-equipped laboratory and follow-through in pilot and production plants. Excellent working conditions; salary commensurate with experience. Send complete résumé with first letter. All replies held in strict confidence. Address Box 1821, care of RUBBER WORLD.

OPPORTUNITY: CHEMIST FOR HIGH-TEMPERATURE COMPOUNDS. OUR COMPANY HAS A FINE OPPORTUNITY FOR A CHEMIST OR CHEMICAL ENGINEER TO DEVELOP WITH THE NEWLY FORMED DIVISION OF A SUCCESSFUL MEDIUM-SIZED RUBBER COMPANY LOCATED IN THE MIDWEST. PLEASE ADDRESS BOX NO. 1822, CARE OF RUBBER WORLD.

MOLDED GOODS PRODUCTION SUPERVISOR

Northern New Jersey

Our company anticipates further expansion of rubber molded goods department. We desire man with broad molded goods background including the actual know-how. Salary commensurate with ability and background, minimum $6,000.00 yearly. Please forward résumé to Box No. 1823, care of RUBBER WORLD.

INDUSTRIAL PRODUCTION ENGINEER

Must be fully experienced in high-speed production methods, able to design tooling for stock preparation, trimming, and assembling of rubber or similar products. Familiar with material flow, plant layout, maintenance safety program, etc. We want a top-grade man, under 45, who is not afraid of hard work. Located Eastern Pa. Replies confidential. State fully age, experience, education, and minimum salary requirement in first letter. Address Box No. 1824, care of RUBBER WORLD.

WANTED: ADHESIVE-TAPE CALENDER OPERATOR AND compounder to take responsibility for new department in growing diversified company in the South. Give complete biography and references. All replies confidential. Address Box No. 1826, care of RUBBER WORLD.

SITUATIONS OPEN (Continued)

TECHNICAL SALESMAN—FAR EAST

Important U. S. supplier to rubber industries needs man to supervise sale of chemical products in Far East, Australia. To visit agents, customers periodically; act as liaison with home office. Must have experience in rubber compounding technical sales; degree in chemistry. Extensive traveling required. Bases include U. S., Australia, Japan, India. Address Box No. 1825, care of RUBBER WORLD.

PRODUCT ENGINEER FOR INDUSTRIAL RUBBER HOSE

Long-established rubber company, located in New Jersey, has position open for a qualified man experienced in hose design and specification hose, both braided and mandrel made. Give full résumé and salary requirements. Our employes have been informed of this advertisement. Address Box No. 1827, care of RUBBER WORLD.

TEXTILE SALES REPRESENTATIVE

Prefer graduate engineer with a knowledge of the technology of fiber uses in the rubber, electrical, and other industrial trades. Should know the properties of natural and synthetic fibers, cord and fiber construction and their influence on usage in the above industries.

Duties will include the sale and application development work connected with the application of synthetic fibers to mechanical rubber goods, electrical, and other industrial uses.

This is an excellent opportunity to join a growing and progressive organization. Position is located in a Midwest metropolitan area. Salary $8,000 to $10,000.

Submit résumé including age, education, experience, and salary history. Address Box No. 1837, care of RUBBER WORLD.

PRACTICAL POLYMER CHEMIST, GRADUATE DEGREE, INdustrial or university research experience, full or part time, able to synthesize compounds, including elastomer-like rubbers. Good salary and possible profit participation. Attractive surroundings in independent laboratory in Princeton area. Summarize qualifications to Box No. 1838, care of RUBBER WORLD.

A CHALLENGING OPPORTUNITY FOR A CHEMIST WHO IS familiar with the compounding and molding of material conforming to AMS Specification, MIL Specifications, silicone molding, Teflon molding, and Kel-F. For one who is desirous of contacting engineering personnel related to all types of intricate problems. This position is available in a small corporation on the East Coast. Write stating qualifications and salary. Only persons desiring to add versatility to their chemistry field should reply. Salary open as warranted by experience and education. Address Box No. 1839, care of RUBBER WORLD.

SITUATIONS WANTED

TECHNICAL SALES POSITION DESIRED BY RUBBER COMpounder with 10 years' exceptionally broad experience in molded and extruded products. Address Box No. 1828, care of RUBBER WORLD.

LATEX CHEMIST, TEN YEARS' EXPERIENCE INCLUDING technical service, and factory research and development. Good background in dipping, textile applications, adhesives, impregnation, and foam. Desires a responsible position with a good future. Willing to relocate. Present salary approximately $8,000. Address Box No. 1829, care of RUBBER WORLD.

CHEMIST OR RUBBER TECHNOLOGIST

Graduate Chemical Engineer with 15 years' experience in manufacturing of molded rubber goods and reclaimed rubber. Familiar with all phases of rubber manufacturing, including research, plant control, supervision, trouble shooting, compounding, laboratory testing, and development of allied chemical products. Address Box No. 1834, care of RUBBER WORLD.

TECHNICAL SERVICE, DEVELOPMENT, APPLICATIONS, chemical market research position with polymer or raw materials supplier to rubber, plastics industries sought by chem. eng. with 12 years' varied background, particularly rubber. Prefer East Coast. Address Box No. 1840, care of RUBBER WORLD.

MACHINERY & SUPPLIES FOR SALE

FOR SALE: 2—FARREL-BIRMINGHAM 16" X 42" MILLS WITH reduction drive, and 100-HP motor; 1—Read 2,000-lb. all-steel double-ribbon horizontal mixer; 1—Ball & Jewell rotary cutter, size O, m.d.; 1—Stewart Bolling 4-roll 58" calender; 1—8" x 16" 2-roll mill, m.d.; 3—Colton #5½ single-punch tablet machines, m.d.; 3—#28 Devine vacuum shelf dryers, 19-59" x 78" shelves complete; 1—6" x 12" laboratory mill, m.d.; also other sizes Hydraulic Presses, Tubers, Banbury Mixers, Mills, Vulcanizers, Calenders, Pellet Presses, Cutters. WANTED: Your Surplus Rubber Machinery. CONSOLIDATED PRODUCTS COMPANY, INC., 64 Bloomfield St., Hoboken, N. J.; HOboken 3-4425; N. Y. Phone: BArclay 7-0600.

U.S.A. Exports of Synthetic Rubber

(Long Tons)

Year	S-Types	Butyl	Neoprene	N-Type	Total
1943	14,937	40	2,540	631	17,608
1944	98,380	530	4,799	557	104,266
1945	76,555	980	5,837	406	83,778
1946	68,763	495	2,642	797	72,697
1947	7,951	62	2,617	755	11,385
1948	1,093	21	2,875	885	4,874
1949	1,401	178	3,330	1,574	6,483
1950	900	31	4,826	1,895	7,652
1951	483	216	6,825	1,725	9,249
1952	9,467	126	9,813	2,695	22,101
1953	7,692	237	11,494	3,245	22,668
1954					
Jan.	618	0	434	295	1,347
Feb.	508	2	1,251	287	2,048
Mar.	1,265	416	930	288	2,899
Apr.	520	62	1,296	454	2,332
May	1,115	373	844	395	2,727
June	881	216	694	215	2,006
July	1,126	421	1,220	358	3,125
Aug.	1,314	384	945	307	2,950
Sept.	785	53	978	270	2,086
Oct.	1,284	189	1,301	455	3,229
Nov.	659	575	1,081	435	2,750
Dec.	994	140	1,088	396	2,618
Total	11,069	2,831	12,062	4,155	30,117
1955					
Jan.	1,381	716	1,046	194	3,337
Feb.	1,331	370	1,049	259	3,009
Mar.	2,162	672	1,287	236	4,357
Apr.	1,807	1,562	1,636	506	5,511
May	3,500	376	1,430	357	5,663
June	6,030	726	1,541	389	8,686
July	5,212	870	1,275	472	7,829
Aug.	7,727	837	1,454	386	9,567
Sept.*	6,469	854	1,365	429	9,117

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Preliminary.

U.S.A. Automotive Inner Tubes

(Thousands of Units)

Year	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954						
Jan.	2,884	3,892	58	6,834	5,395	10,107
Feb.	2,636	2,908	74	5,617	5,896	10,448
Mar.	3,165	2,774	74	6,013	6,399	10,869
Apr.	3,134	2,770	97	6,001	6,266	11,234
May	3,017	2,900	84	6,002	5,909	11,170
June	2,889	3,657	85	6,631	5,739	10,379
July	2,707	3,471	87	6,265	4,132	8,429
Aug.	2,174	3,504	69	5,747	3,773	6,588
Sept.	1,130	2,839	64	4,033	4,489	7,179
Oct.	429	2,566	92	3,087	3,953	8,313
Nov.	449	2,142	90	2,681	3,245	8,706
Dec.	476	2,019	74	2,569	3,201	9,299
Total	25,090	35,442	948	61,480	58,397	
1955						
Jan.	413	3,629	74	4,116	3,089	8,252
Feb.	352	2,430	80	2,862	2,850	8,243
Mar.	491	2,732	105	3,328	3,234	8,217
Apr.	530	2,635	85	3,250	2,836	7,963
May	531	2,617	85	3,233	3,005	7,735
June	477	3,003	85	3,565	3,136	7,326
July	475	2,915	60	3,450	2,768	6,664
Aug.	394	3,274	65	3,733	2,923	5,917
Sept.	360	2,814	86	3,261	3,169	5,966

Source: The Rubber Manufacturers Association, Inc.

U.S.A. Consumption of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1943	9,578	150	1,400	....	1,550	11,128
1944	6,085	6,000	4,400	....	10,400	16,485
1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954						
Jan.	5,882	3,475	615	275	4,365	10,247
Feb.	5,595	3,568	575	250	4,393	9,988
Mar.	6,610	3,982	729	335	5,046	11,656
Apr.	5,892	3,748	603	324	4,675	10,567
May	5,969	3,394	586	348	4,328	10,297
June	5,884	3,653	629	402	4,684	10,568
July	4,298	2,587	482	296	3,365	7,663
Aug.	5,228	2,834	561	351	3,746	8,974
Sept.	6,903	3,599	628	379	4,606	11,509
Oct.	7,527	4,347	612	376	5,335	12,862
Nov.	7,622	4,411	631	411	5,453	13,075
Dec.	7,671	4,575	600	460	5,635	13,306
Yr.-end adj.	+350	....	....	+300	....	....
Total	75,931	44,173	7,261	4,507	55,931	131,862
1955						
Jan.	7,355	4,537	661	506	5,704	13,059
Feb.	7,066	4,881	689	501	6,071	13,137
Mar.	8,415	5,861	828	509	7,198	15,613
Apr.	7,732	5,209	748	651	6,608	14,340
May	6,643	4,278	768	593	6,089	12,732
June	6,589	4,885	722	887	6,494	13,083
July	5,469	3,830	535	626	4,991	10,460
Aug.	6,784	4,514	770	810	6,094	12,878
Sept.*	7,572	5,605	789	884	7,278	14,850

Source: Chemical & Rubber Division, Business & Defense Services Administration, United States Department of Commerce.
* Preliminary.

U.S.A. Rubber Industry Sales and Inventories

(Million of Dollars)

	Value of Sales*: 1952	1953	1954	1955	Manufacturers' Inventories*: 1952	1953	1954	1955
Jan.	408	424	348	405	809	866	844	798
Feb.	402	435	351	440	842	868	857	782
Mar.	400	473	388	466	857	880	849	805
Apr.	407	444	375	445	850	874	812	784
May	402	422	357	465	855	888	810	810
June	409	436	377	465	851	914	829	850
July	377	448	374	471	890	925	784	853
Aug.	388	409	337	456	877	897	761	863
Sept.	427	416	334	....	871	908	804	....
Oct.	423	395	332	....	866	881	838	....
Nov.	383	346	388	....	850	867	819	....
Dec.	418	369	407	....	877	868	929	....
Total	4,844	5,017	4,368	....	Av. 858	853	831	....

Source: Office of Business Economics, U. S. Department of Commerce.
* Adjusted for seasonal variation.

Domestic Sulfur Industry

(Long Tons)

	Jan.-Aug., 1954	Jan.-Aug., 1955
Native sulfur (Frasch):		
Production	3,677,632	3,587,989
Mine or plant shipments	3,411,784	3,926,527
Apparent sales*	3,410,756	3,872,543
Producers' stocks†	3,289,362	2,943,466
Recovered sulfur:‡		
Production	240,100	264,000
Mine or plant shipments	236,787	262,252
Apparent sales*	241,787	260,229
Producers' stocks†	105,657	112,837

Source: Bureau of Mines, United States Department of the Interior.
* Calculated from production and change in stocks during the period.
† Producers' stocks at mines or plants, in transit, and in warehouse at end of period.
‡ Recovered sulfur of 97% purity or greater.

MACHINERY AND SUPPLIES FOR SALE (Continued)

FOR SALE: DOUBLE-ARM SIGMA-BLADE JACKETED mixers; (4) Read 50 gal., 30 HP; (2) W & P 100-gal. Kux model 25 rotary pellet presses, 21 and 25 punch. 14,000-gal. A. O. Smith Glass-Lined Tanks. WE BUY SURPLUS EQUIPMENT. PERRY EQUIPMENT CORP., 1424 N. 6th St., Phila., 22, Pa.

BANBURY SIZE B LAB MIXER. THROPP 3" X 8" LAB MILL. Stokes 150-ton semi-automatic Hydr. Press. Kux 2½"-dia. single-punch preform machine. Farrel 16" x 48" and 15" x 36", 2-roll rubber mills, and sizes up to 84". New and used lab. 6" x 13" and 6" x 16" mills and calenders. Baker-Perkins Jacketed Mixers 100, 50, and 9 gals. HPM 200-ton Hydr. Press 30" x 48" platens. Brunswick 200-ton 21" x 21" platens. 100-ton 20" x 20" platens. 150-ton 24" x 24" platens. Large stock hydraulic presses 12" x 12" to 48" x 48" platens. Hydraulic pumps and Accumulators. Extruders. Rotary Cutters Stokes Molding Presses. Single-Punch & Rotary Preform Machines. Banbury Mixers, Crushers, Churns, Bale Cutters, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT CO., 107—8th St., Brooklyn 15, N. Y. STerling 8-1944.

PARTIAL LISTING OF RUBBER & PLASTIC MACHINERY FOR SALE

60" Farrel Mill
60" Farrel Calender
66" Farrel Calender
5—42 x 42 Hydraulic Presses
2—48 x 48 30" Ram Birdsboro Presses
32 x 92 2-Roll Farrel Calender
40" Farrel Mill
48" Farrel Mill
Also:—Extruders, Reverse Roll Coaters, Spreaders, Laboratory Mills, etc.

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CUTTING—RUBBER—SOLES
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BEVEL OR STRAIGHT EDGE
CUT PRECISION SOLES UP TO 1" THICK
WELLMAN CO., MEDFORD, MASS., U. S. A.

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MANDRELS
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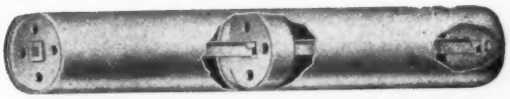
L. C. WADE CO., INC.
79 BENNETT ST. LYNN, MASS.

STEEL CALENDER STOCK SHELLS



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Used in manufacturing rubber and plastic products.
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NEW and REBUILT MACHINERY
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VULCANIZERS, ACCUMULATORS CUTTING MACHINES, PULVERIZERS
UNITED RUBBER MACHINERY EXCHANGE
183-189 ORATON ST. CABLE "URME" NEWARK 4, N. J.

World Production of Natural Rubber

(1,000 Long Tons)

Year	Malaya		Indonesia		All Other	Total
	Estate	Native	Estate	Native		
1948	403.6	294.6	101.7	330.6	394.5	1,525.0
1949	400.8	270.7	169.1	263.9	385.5	1,490.0
1950	376.7	317.4	175.1	521.4	469.4	1,860.0
1951	328.8	276.5	222.5	591.9	465.3	1,885.0
1952	341.7	242.5	293.2	456.0	456.6	1,790.0
1953	341.8	232.6	301.8	390.4	458.4	1,725.0
1954						
Jan.	30.3	19.1	24.2	34.9	44.0	152.5
Feb.	25.4	18.0	23.0	30.2	30.9	127.5
Mar.	24.6	17.5	23.2	36.7	35.5	137.5
Apr.	24.8	15.4	21.2	37.0	34.1	132.5
May	27.6	18.6	22.9	32.9	30.5	132.5
June	27.0	16.3	21.0	33.5	39.7	137.5
July	31.0	23.0	26.8	46.2	38.0	165.0
Aug.	30.9	21.6	21.9	37.1	38.5	150.0
Sept.	30.1	23.4	23.6	46.4	41.5	165.0
Oct.	29.5	20.8	23.9	45.6	40.2	160.0
Nov.	31.9	22.9	24.3	36.8	46.6	162.5
Dec.	30.4	24.2	24.5	47.0	53.9	180.0
Total	343.5	240.8	280.5	464.3	473.4	1,802.5
1955*						
Jan.	29.3	27.9	23.6	17.1	42.1	140.0
Feb.	28.5	20.4	22.3	48.3	38.0	157.5
Mar.	27.5	26.7	23.0	24.3	38.5	140.0
Apr.	24.2	20.5	20.7	27.5	42.1	135.0
May	27.4	22.4	18.0	29.9	37.3	135.0
June	27.6	22.9	21.3	52.8	40.4	165.0
July	30.3	25.7	21.2	32.5	42.8	152.5
Aug.	30.7	23.6	20.0	43.2	37.5	155.0

Source: BDSA, United States Department of Commerce; Secretariat of the International Rubber Study Group; and United Baltic Corp., Ltd.
* Some figures revised.

World Production of Synthetic Rubber

(1,000 Long Tons)

Year	U.S.A.	Canada	Germany*	Total
1943	231.8	2.5	115.8	350.1
1944	764.1	34.9	101.6	900.5
1945	820.4	45.8	....	866.1
1946	740.0	51.0	5.6	806.6
1947	508.7	42.4	8.2	559.3
1948	488.3	40.5	3.4	532.2
1949	393.7	46.6	....	440.3
1950	476.2	58.4	....	534.6
1951	845.2	62.3	0.9	908.4
1952	798.6	74.3	4.9	877.8
1953	848.4	80.9	6.3	935.6
1954				
Jan.	57.3	7.3	0.4	65.0
Feb.	53.4	6.7	0.4	60.5
Mar.	55.8	7.4	0.5	63.7
Apr.	47.6	7.1	0.6	55.3
May	46.6	7.3	0.5	54.4
June	45.9	5.9	0.5	52.3
July	47.0	5.8	0.5	53.3
Aug.	48.8	7.3	0.7	56.8
Sept.	51.4	7.9	0.6	59.9
Oct.	55.6	8.0	0.6	64.2
Nov.	55.0	8.0	0.7	63.7
Dec.	58.5	7.9	0.9	67.3
Total	622.9	86.6	6.9	716.4
1955				
Jan.	69.9	8.1	0.9	78.9
Feb.	67.7	7.6	0.9	76.2
Mar.	78.5	8.7	0.8	88.0
Apr.	75.7	7.6	0.8	84.1
May	82.0	8.9	0.9	91.7
June	78.2	8.6	0.9	87.7
July	81.9	8.2	0.9	91.0
Aug.	84.00	....	....	....

Source: Secretariat of the International Rubber Study Group; and BDSA, United States Department of Commerce.
* British Zone only from 1945 to 1947; Bizone for 1948 and 1949; Federal Republic since 1950.

World Consumption of Natural Rubber

(1,000 Long Tons)

Year	United States	U.S.S.R.* and China	United Kingdom	Other Foreign	Total Foreign	Grand* Total
1948	627.3	121.0	193.7	480.5	795.2	1,422.5
1949	574.5	132.5	184.3	546.2	863.0	1,437.5
1950	720.3	152.5	219.7	612.5	984.7	1,705.0
1951	454.0	136.3	234.2	675.5	1,046.0	1,500.0
1952	453.8	146.8	197.3	652.1	996.2	1,450.0
1953						
Jan.	47.8	10.8	17.9	58.5	87.2	135.0
Feb.	45.2	18.2	15.4	56.2	89.8	135.0
Mar.	50.7	18.5	15.6	60.2	94.3	145.0
Apr.	49.4	11.0	18.4	58.7	88.1	137.5
May	46.9	11.3	16.3	58.0	85.6	132.5
June	48.2	5.0	15.7	63.6	84.3	132.5
July	43.9	3.1	16.8	63.7	83.6	127.5
Aug.	43.7	2.0	14.2	55.1	71.3	115.0
Sept.	45.2	9.3	17.8	65.2	92.3	137.5
Oct.	46.8	3.8	21.3	65.6	90.7	137.5
Nov.	43.3	4.4	20.2	82.1	106.7	150.0
Dec.	42.4	4.5	17.0	66.1	87.6	130.0
Total	553.5	101.9	206.6	753.0	1,061.5	1,615.0
1954						
Jan.	47.0	7.8	20.3	67.4	95.5	142.5
Feb.	46.9		17.5	70.6	88.1	135.0
Mar.	53.7	2.7	19.1	72.0	93.8	147.5
Apr.	51.4	15.5	19.7	68.4	103.6	155.0
May	51.4	1.1	18.8	66.2	86.1	137.5
June	54.2	3.6	18.0	64.1	85.7	140.0
July	37.9	0.8	17.7	68.6	87.1	125.0
Aug.	38.1	8.9	14.2	63.8	86.9	125.0
Sept.	52.4	11.5	19.3	71.8	102.6	155.0
Oct.	56.0	3.5	23.1	74.9	101.5	157.5
Nov.	53.3	2.3	19.2	75.2	96.7	150.0
Dec.	55.2	5.0	19.6	72.7	97.3	152.5
Total	597.5	62.7	226.5	835.7	1,124.9	1,725.0
1955†						
Jan.	56.9	7.8	22.7	72.9	103.4	160.0
Feb.	51.0	....	19.5	....	91.5	142.5
Mar	58.5	7.3	20.8	78.1	104.6	162.5
Apr.	53.0		23.3	....	104.6	160.0
May	54.7		20.5	....	105.3	160.0
June	56.3	2.8	18.3	82.6	103.7	160.0
July	46.2	1.8	18.3	76.2	96.3	142.5
Aug.	48.4	0.1	16.0	78.0	94.1	142.5

Source: BDSA, United States Department of Commerce; Secretariat of the International Rubber Study Group; and United Baltic Corp., Ltd.
* Estimated.
† Some figures revised.

World Consumption of Synthetic Rubber*

(1,000 Long Tons)

Year	U.S.A.	Canada	United Kingdom	Total† Continent of Europe	World† Grand Total
1943	170.9	3.7	3.3	115.0	292.5
1944	566.7	24.7	41.8	100.0	737.5
1945	693.6	35.9	63.8	55.0	865.0
1946	761.7	29.6	30.1	75.0	912.5
1947	559.7	29.2	2.8	32.5	625.0
1948	442.1	20.6	2.6	15.0	480.0
1949	414.4	18.1	2.4	14.0	450.0
1950	538.3	22.6	2.8	16.0	580.0
1951	758.9	26.4	3.9	22.3	812.5
1952	807.0	33.6	4.9	35.0	885.0
1953	784.8	35.9	4.9	39.3	872.5
1954					
Jan.	50.2	2.6	0.6	3.8	57.5
Feb.	49.1	3.0	0.5	4.0	57.5
Mar.	56.1	2.9	0.7	4.3	65.0
Apr.	53.6	2.7	0.8	4.0	62.5
May	52.6	2.7	0.7	4.0	60.0
June	57.2	2.8	0.7	4.3	67.5
July	41.5	1.9	0.6	4.3	50.0
Aug.	42.1	2.0	0.7	3.5	47.5
Sept.	53.9	2.4	0.8	4.5	62.5
Oct.	58.3	2.1	1.0	4.3	67.5
Nov.	57.3	2.6	0.8	4.5	65.0
Dec.	64.1	2.4	0.8	4.5	72.5
Total	636.7	30.1	8.7	50.8	740.0
1955					
Jan.	68.4	2.6	1.2	5.0	77.5
Feb.	67.6	3.1	1.1	4.8	80.0
Mar.	77.1	3.4	1.2	5.3	87.5
Apr.	72.1	3.0	1.5	5.3	82.5
May	75.7	3.3	1.4	5.5	87.5
June	80.2	3.8	1.5	5.8	90.0
July	63.3	2.7	1.4	5.5	75.0
Aug.	73.1	....	1.5	4.8	82.5

Source: Secretariat of the International Rubber Study Group; BDSA, United States Department of Commerce.
* Includes latices.
† Figures estimated or partly estimated.

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	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
Passenger Car						
1951	26,729	34,226	723	61,678	65,546	6,973
1952	24,106	45,458	741	70,305	74,341	11,251
1953	33,106	45,798	809	79,713	81,455	13,044
1954						
Jan.	2,549	3,378	59	5,986	5,251	12,279
Feb.	2,323	3,001	60	5,384	5,952	12,832
Mar.	2,809	3,753	45	6,607	6,878	13,112
Apr.	2,785	4,328	95	7,208	7,031	12,955
May	2,695	4,503	101	7,300	6,985	12,575
June	2,587	5,326	89	8,002	7,755	12,323
July	2,516	5,222	73	7,812	5,605	10,063
Aug.	2,283	4,605	73	6,961	4,709	7,797
Sept.	1,375	3,825	73	5,273	6,242	8,950
Oct.	1,617	3,422	81	5,120	6,702	10,531
Nov.	2,823	2,844	91	5,758	6,480	11,331
Dec.	3,383	2,845	87	6,315	7,215	12,228
Total	29,746	47,043	928	77,717	76,806	
1955						
Jan.	3,481	4,139	79	7,699	7,797	12,363
Feb.	3,540	3,551	83	7,174	7,549	12,643
Mar.	4,326	4,255	104	8,685	8,810	12,874
Apr.	3,967	4,677	88	8,733	8,000	12,197
May	3,871	4,705	87	8,663	8,742	12,235
June	3,482	5,399	97	8,979	9,383	12,698
July	3,461	4,802	76	8,339	7,893	12,199
Aug.	2,984	5,058	60	8,103	7,585	11,636
Sept.	2,749	4,366	74	7,189	7,882	12,407
Truck and Bus						
1951	5,424	10,386	954	16,764	17,859	1,791
1952	5,378	8,884	779	15,041	16,070	2,859
1953	4,843	9,326	734	14,904	14,696	2,676
1954						
Jan.	342	615	59	1,016	1,048	2,698
Feb.	311	556	57	924	1,089	2,877
Mar.	354	597	71	1,022	1,103	2,966
Apr.	346	607	81	1,035	1,034	2,951
May	324	612	83	1,020	980	2,928
June	303	703	71	1,076	1,041	2,895
July	265	725	82	1,073	755	2,577
Aug.	243	824	51	1,118	717	2,188
Sept.	227	711	57	995	1,037	2,233
Oct.	251	828	66	1,145	1,167	2,268
Nov.	301	716	67	1,084	1,145	2,345
Dec.	325	625	81	1,031	1,229	2,546
Total	3,592	8,111	826	12,529	12,347	
1955						
Jan.	303	827	81	1,211	1,243	2,586
Feb.	294	730	74	1,098	1,196	2,678
Mar.	454	672	96	1,222	1,273	2,734
Apr.	489	639	76	1,204	1,153	2,693
May	481	655	65	1,202	1,208	2,701
June	449	730	76	1,255	1,320	2,763
July	429	909	51	1,389	1,134	2,485
Aug.	378	922	59	1,359	1,132	2,272
Sept.	393	804	66	1,264	1,243	2,268
Total Automotive						
1951	32,153	44,612	1,677	78,442	83,405	8,765
1952	29,484	54,342	1,520	85,346	90,411	14,110
1953	37,949	55,124	1,543	94,617	96,150	15,720
1954						
Jan.	2,891	3,993	118	7,002	6,299	14,977
Feb.	2,634	3,557	117	6,308	7,042	15,709
Mar.	3,163	4,350	116	7,629	7,981	16,077
Apr.	3,131	4,935	176	8,243	8,065	15,906
May	3,020	5,115	184	8,319	7,965	15,504
June	2,890	6,029	160	9,079	8,796	15,218
July	2,782	5,948	155	8,884	6,360	12,640
Aug.	2,527	5,429	123	8,079	5,427	9,985
Sept.	1,602	4,537	130	6,269	7,279	11,184
Oct.	1,868	4,251	147	6,266	7,869	12,799
Nov.	3,124	3,560	158	6,842	7,626	13,676
Dec.	3,707	3,470	169	7,346	8,444	14,774
Total	33,338	55,154	1,754	90,246	89,153	
1955						
Jan.	3,785	4,967	159	8,911	9,040	14,949
Feb.	3,833	4,281	157	8,272	8,745	15,321
Mar.	4,780	4,926	201	9,907	10,083	15,609
Apr.	4,457	5,315	165	9,937	9,153	14,890
May	4,352	5,361	152	9,865	9,949	14,936
June	3,931	6,129	174	10,234	10,703	15,460
July	3,890	5,711	128	9,729	9,027	14,684
Aug.	3,362	5,980	119	9,462	8,717	13,908
Sept.	3,142	5,171	140	8,453	9,125	14,675

Source: The Rubber Manufacturers Association, Inc.

U.S.A. Rubber Industry Employment, Wages, Hours

Year	Production Workers (1000's)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Consumers Price Index
		All Rubber Products			
1939	121	$27.84	39.9	$0.75	....
1952	212	74.48	40.7	1.83	113.5
1953	221	77.78	40.3	1.93	114.4
1954					
May	197.0	77.81	39.7	1.96	115.0
June	198.4	79.60	40.2	1.98	115.1
July	173.1	76.83	39.4	1.95	115.2
Aug.	177.0	76.25	39.1	1.95	115.0
Sept.	198.9	77.81	39.3	1.98	114.7
Oct.	204.2	81.20	40.4	2.01	114.5
Nov.	204.6	83.02	41.1	2.02	114.6
Dec.	209.3	85.07	41.7	2.04	114.3
1955					
Jan.	210.5	84.25	41.3	2.04	114.3
Feb.	210.4	84.25	41.3	2.04	114.3
Mar.	211.2	83.44	40.9	2.04	114.3
Apr.	211.6	86.11	41.8	2.06	114.2
May	214.4	86.94	41.8	2.08	114.2
June	220.0	88.83	42.3	2.10	114.4
July	216.9	86.52	41.2	2.10	114.7
Aug.	219.0	....	....	....	114.5
		Tires and Tubes			
1939	54.2	$33.36	35.0	$0.96	
1952	92.9	85.65	40.4	2.12	
1953	93.0	88.31	39.6	2.23	
1954					
May	83.9	88.65	39.4	2.25	
June	85.0	92.06	40.2	2.29	
July	67.3	87.01	38.5	2.26	
Aug.	68.0	85.65	37.4	2.29	
Sept.	85.2	86.18	38.3	2.25	
Oct.	86.5	90.39	39.3	2.30	
Nov.	83.7	94.54	40.4	2.34	
Dec.	87.0	98.18	41.6	2.36	
1955					
Jan.	87.6	97.41	41.1	2.37	
Feb.	86.5	96.46	40.7	2.37	
Mar.	87.4	95.27	40.2	2.37	
Apr.	88.4	101.28	42.2	2.40	
May	90.1	100.91	41.7	2.42	
June	91.0	105.60	43.1	2.45	
July	91.5	103.82	42.9	2.42	
		Rubber Footwear			
1939	14.8	$22.80	37.5	$0.61	
1952	22.9	62.22	40.4	1.54	
1953	23.7	65.60	40.0	1.64	
1954					
May	19.8	65.46	39.2	1.67	
June	19.8	67.30	40.3	1.67	
July	20.1	68.45	40.5	1.69	
Aug.	20.5	66.40	40.0	1.66	
Sept.	21.0	66.08	39.1	1.69	
Oct.	21.9	71.34	41.0	1.74	
Nov.	22.3	71.51	41.1	1.74	
Dec.	22.3	71.69	41.2	1.74	
1955					
Jan.	22.1	68.97	40.1	1.72	
Feb.	21.5	69.72	40.3	1.73	
Mar.	21.4	69.72	40.3	1.73	
Apr.	21.2	70.99	40.8	1.74	
May	21.4	70.64	40.6	1.74	
June	21.6	71.34	41.0	1.74	
July	21.8	71.93	41.1	1.75	
		Other Rubber Products			
1939	51.9	$23.34	38.9	$0.61	
1952	96.0	66.58	41.1	1.62	
1953	104.1	70.93	41.0	1.73	
1954					
May	93.3	70.98	40.1	1.77	
June	93.6	70.98	40.1	1.77	
July	85.7	70.62	39.9	1.77	
Aug.	88.5	71.15	40.2	1.77	
Sept.	92.7	72.36	40.2	1.80	
Oct.	95.8	74.98	41.2	1.82	
Nov.	98.6	75.71	41.6	1.82	
Dec.	100.0	76.44	42.0	1.82	
1955					
Jan.	100.8	76.08	41.8	1.82	
Feb.	101.4	76.86	42.0	1.83	
Mar.	102.4	76.13	41.6	1.83	
Apr.	101.1	76.13	41.6	1.83	
May	105.0	78.31	42.1	1.86	
June	106.4	77.93	41.9	1.86	
July	103.6	73.84	39.7	1.86	

Source: BLS, United States Department of Labor.

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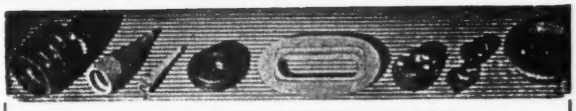

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Carbon Black Statistics—First Nine Months, 1955

Furnace blacks are classified as follows: SRF, semi-reinforcing furnace black; HMF, high modulus furnace black; FEF, fast-extruding furnace black; HAF, high abrasion furnace black; SAF, semi-abrasion furnace black.

(Thousands of Pounds)

Production	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Furnace types									
Thermal	9,315	8,269	10,317	10,620	12,094	12,077	12,189	12,879	12,164
SRF	25,099	26,162	26,258	25,634	24,974	26,561	28,371	28,813	29,315
HMF	9,060	7,610	8,538	7,644	7,665	7,015	8,700	7,867	9,598
FEF	12,395	11,597	14,943	17,039	19,196	19,013	18,938	20,125	20,051
HAF	33,199	29,344	34,011	35,341	36,249	37,238	39,592	40,692	36,672
SAF	15,627	18,010	18,139	17,201	15,699	14,494	12,260	10,203	10,786
Total furnace	104,695	100,992	112,206	113,479	115,877	116,398	120,050	120,584	118,586
Contact types	29,693	27,153	30,750	31,676	30,559	30,238	30,466	30,141	29,717
Totals	134,388	128,145	142,956	145,155	146,436	146,636	150,516	150,725	148,303
Shipments									
Furnace types									
Thermal	8,209	9,756	11,957	10,659	12,150	12,426	11,490	11,121	11,986
SRF	26,411	26,851	27,654	28,722	27,508	27,808	26,742	25,394	28,124
HMF	8,318	8,399	10,089	8,834	9,129	9,532	8,288	8,241	8,818
FEF	15,737	16,801	19,144	18,139	18,641	17,068	16,179	17,103	17,954
HAF	32,602	32,373	35,163	34,764	35,505	35,548	33,872	36,865	34,161
SAF	14,069	13,754	15,431	15,721	15,108	14,491	14,160	11,625	14,375
Total furnace	105,346	107,934	119,438	116,839	118,041	116,873	110,731	110,349	115,418
Contact types	43,403	35,263	42,107	39,827	37,073	36,697	33,228	40,330	38,081
Totals	148,749	143,197	161,545	156,666	155,114	153,570	143,959	150,679	143,499
Producers' Stocks, End of Period									
Furnace types									
Thermal	6,513	5,026	3,386	3,347	3,291	2,942	3,641	5,399	5,577
SRF	16,466	15,777	14,381	11,293	8,759	7,512	9,141	12,560	13,751
HMF	25,004	24,215	22,664	21,474	20,010	17,493	17,905	17,531	18,311
FEF	23,204	18,000	13,799	12,699	13,254	15,199	17,958	20,980	23,077
HAF	28,579	25,550	24,398	24,975	25,719	27,409	33,129	36,956	39,467
SAF	28,340	32,596	35,304	36,784	37,375	37,378	35,478	34,061	30,472
Total furnace	128,106	121,164	113,932	110,572	108,408	107,933	117,252	127,487	130,655
Contact types	172,647	164,537	153,180	145,029	138,515	132,056	129,294	119,105	110,741
Totals	300,753	285,701	267,112	255,601	246,923	239,989	246,546	246,592	241,396
Exports									
Furnace types	18,318	21,137	23,392	22,234	21,165	20,805	20,413	19,985	...
Contact types	15,973	15,583	19,083	19,175	16,256	15,973	15,252	19,529	...
Totals	34,291	36,720	42,475	41,409	37,421	36,778	35,665	39,514	...

Source: Bureau of Mines, United States Department of the Interior, Washington, D. C.

CALENDAR of COMING EVENTS

January 17
Elastomer & Plastics Group, Northeastern Section, ACS. "Specialty Latex Applications."

January 23-26
Seventh Annual Plant Maintenance & Engineering Show. Philadelphia, Pa.

January 26-27
Second Annual General Assembly of Engineers Joint Council. Hotel Statler, New York, N. Y.

January 27
Akron Rubber Group. Mayflower Hotel, Akron, O.

February 3
Division of High-Polymer Physics, American Physical Society. Joint Symposium with Society of Rheology. Twenty-Fifth Anniversary Celebration of American Institute of Physics. New York, N. Y.

February 7
The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif.

February 9
Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

February 17
Chicago Rubber Group. Furniture Club, Chicago, Ill.

February 21
Elastomer & Plastics Group, Northeastern Section, ACS.

March 6
The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif.

March 15
Elastomer & Plastics Group, Northeastern Section, ACS. Symposium on Structure of Rubbers.

March 15-17
Division of High-Polymer Physics, American Physical Society. Annual Meeting, Pittsburgh, Pa.

March 16
Chicago Rubber Group. Furniture Club, Chicago, Ill.

March 18-21
American Society of Mechanical Engineers. Spring Meeting. Multnomah Hotel, Portland, Oreg.

April 3
The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif.

April 3-9
International Symposium on Macromolecular Chemistry. The Weizmann Institute of Science, Rehovot, Israel.

April 6
Akron Rubber Group. Hotel Mayflower, Akron, O.

April 12
Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

April 17
Elastomer & Plastics Group, Northeastern Section, ACS.

May 15
Elastomer & Plastics Group.

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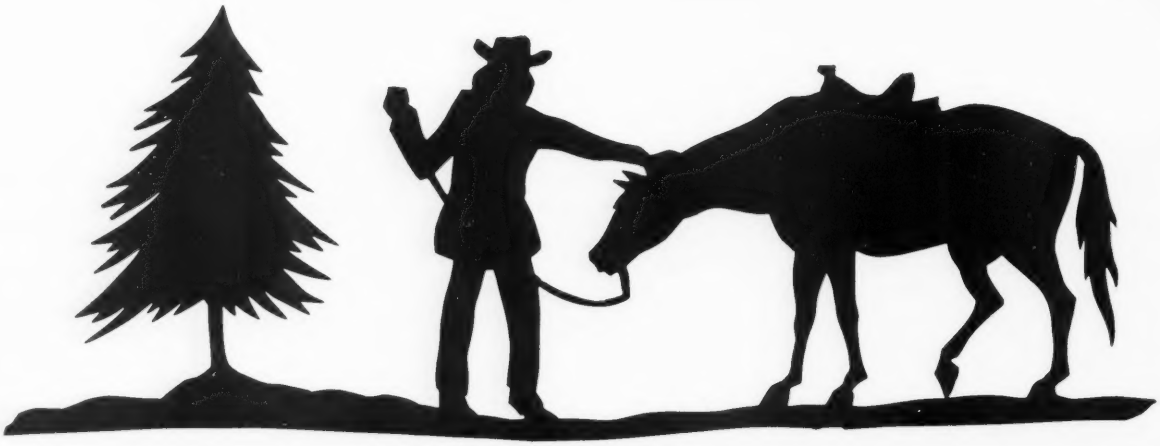

...thanks

Christmas is a time when we count our blessings and reiterate our thanks to you for helping us attain our best year.

To you we send the Season's Greetings and best wishes for your future success and happiness. We look forward to a continuance of cordial relations with all our old friends and to the gaining of new friends during 1956.

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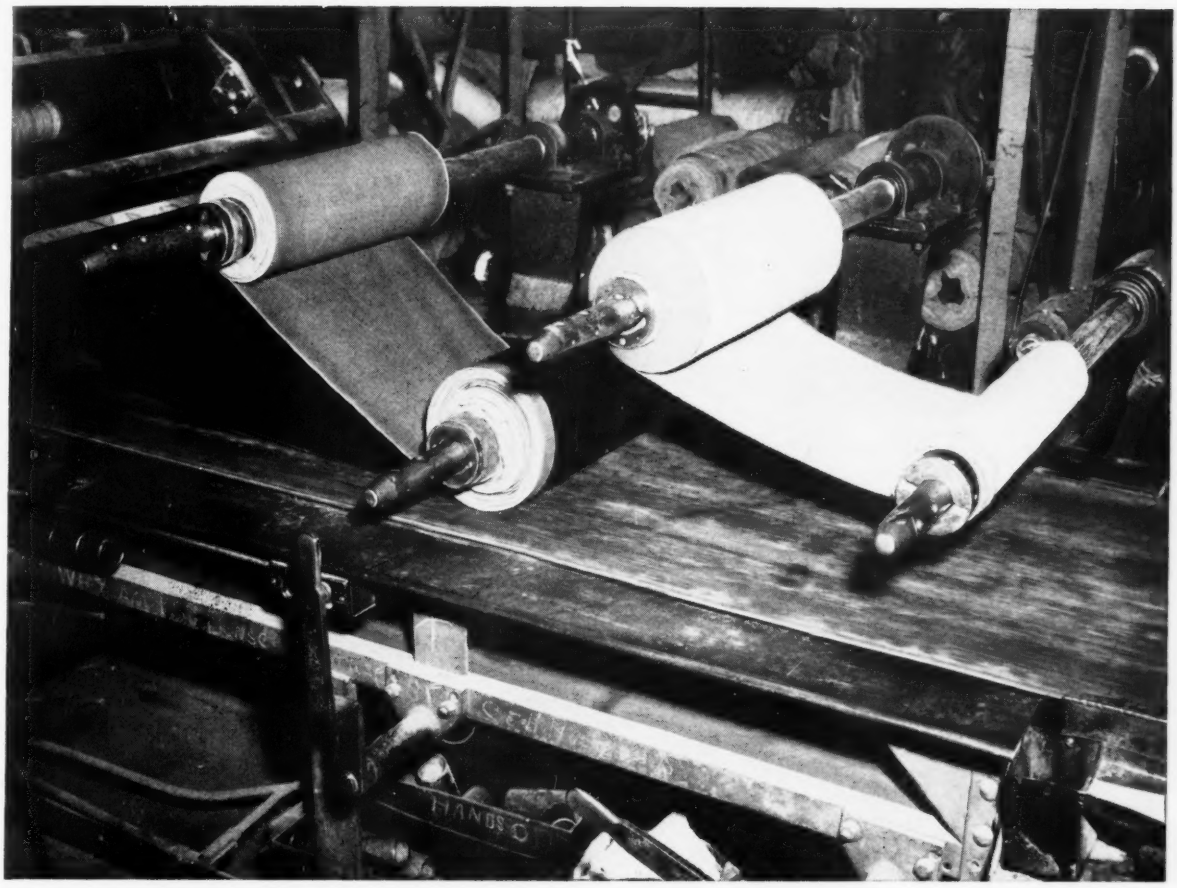

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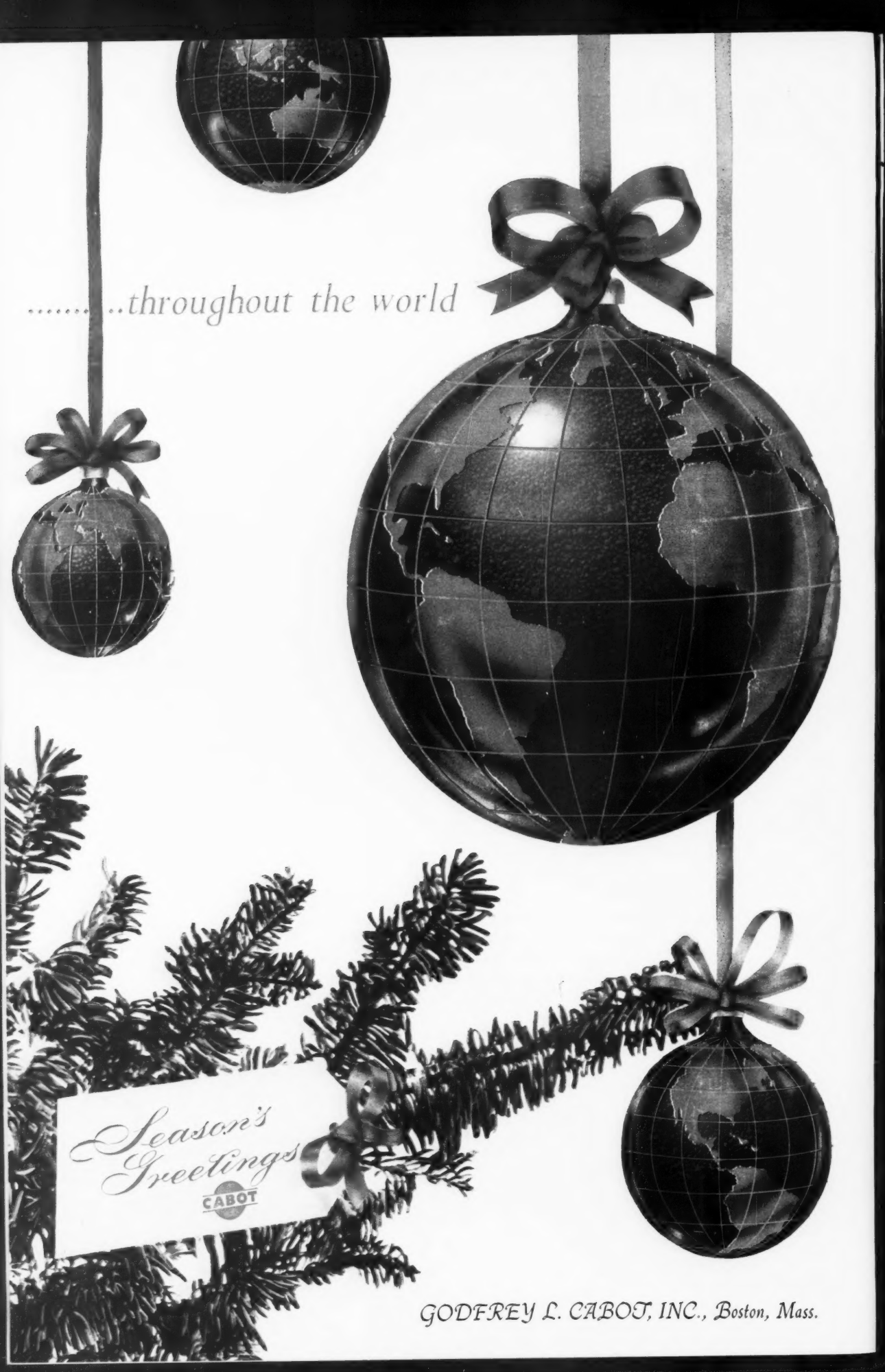

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